COMMODORE user

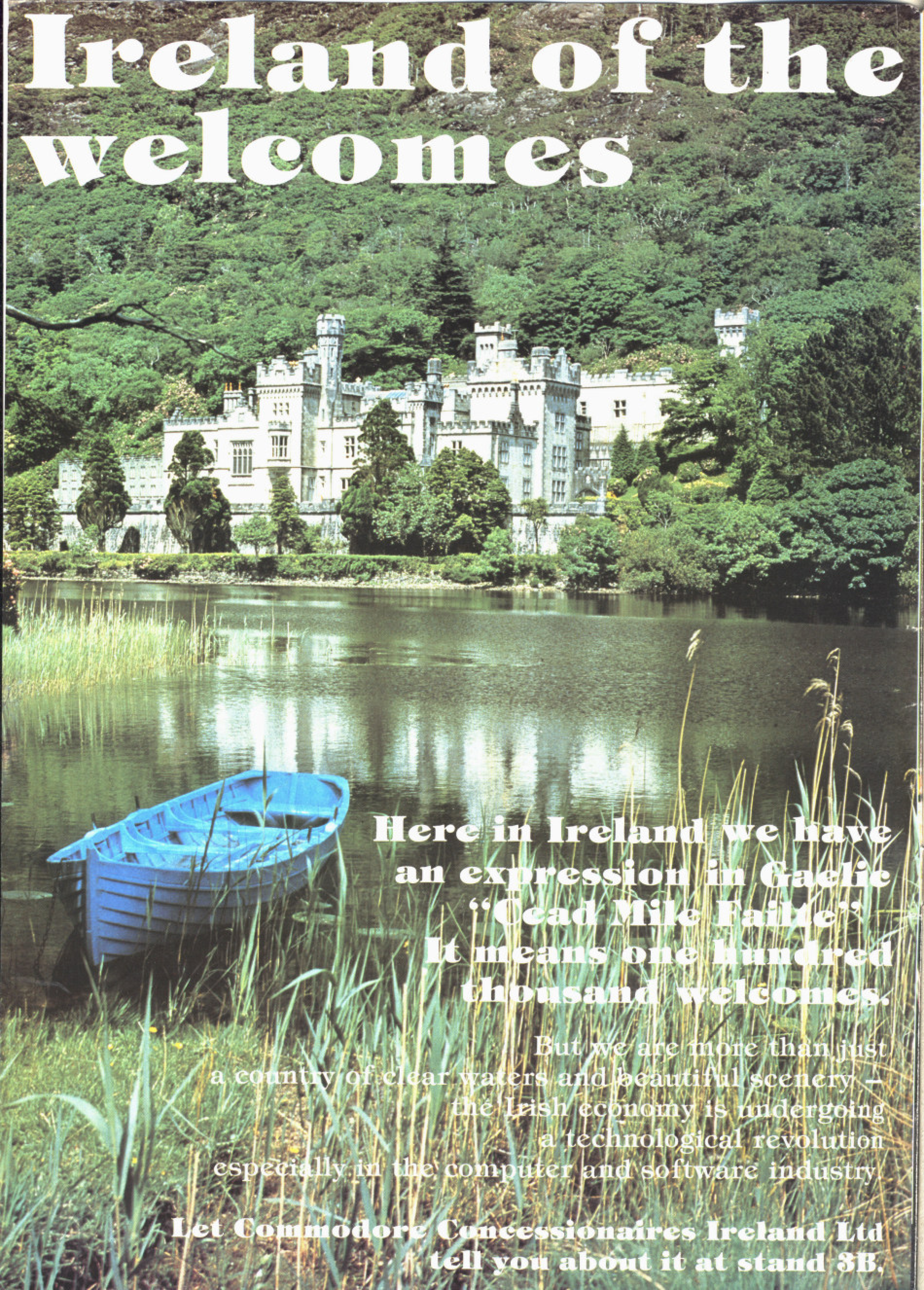
Incorporating the Official Show Catalogue

June 1983. Price 50p

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

Thursday 9th – Saturday 11th June 1983

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Here in Ireland we have an expression in Gaelic "Cead Mile Failte" It means one hundred thousand welcomes.
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Contents

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Production Editor	Karl Dallas
Production Assistants	Gillian Frank, Maggie Underwood

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Editorial

Welcome to the first issue of *Commodore User,* the new magazine for everyone who has an interest in getting the most from Commodore computers.

Commodore User comes from the Paradox Group — small, independent, but above all *specialised.* You may know of us from *Vic Computing,* the magazine dedicated to the Vic-20: but that is only one of our titles devoted to specific microcomputers and specific uses of computers. To put it simply, we specialise in writing about small computers: and we specialise in writing about the practical uses of those computers.

We run such computers ourselves both for business and for pleasure — so we know what we're talking about.

And we know what you want to read about. We buy additional hardware, software, and services; we write and use programs; we have to struggle with the same user manuals that you do; we have all the pleasures and problems of the real-world microcomputer user. . . so we know what the user wants to hear.

Commodore User will reflect all of that. We will be covering the full range of Commodore products — though our bias will naturally be to the mass-market sellers like the Vic and the Commodore 64, where the sheer range of options for the user and the variety of possible uses justify the presence of an authoritative commentator and educator like the new magazine. We will not be neglecting the 700s and 8000s, however.

So what sort of magazine will you be buying?

We start from three premises. First, *Commodore User* will be *useful.* That means *Commodore User* will *not* be abstruse and technical: our articles will cover a good range, but the stress will be on practicality and general relevance to the bulk of our readers.

Second, *Commodore User* will be *authoritative.* We have already signed up some of the best technicai columinsts to explain the idiosyncracies of the Commodore computers, to answer your queries, to reveiw the kind of add-on products you should or should not be considering. To help you get more out of your acquisition, in fact.

And we don't regard the 'best' commentators simply as those that know what they're talking about. We also demand that they can express themselves articulately; their contributions are *readable* as well as knowledgeable.

That's the third point — *Commodore User* will be a good read. We're not trying to produce a reference book or a technical manual. So we spend money on the design of the magazine, trying to make it look good and trying to make the format suit the information. We spend time revising and editing the articles, ensuring that the writing style makes the subject comprehensible (and maybe *entertaining* too). We plan our issues for balance, covering a variety of topics and a range of different levels of knowledge so that there's something for everyone in each issue.

We care about what we do. And, unlike some micro magazines, we care about what you the readers want.

How and when?

This is the pilot issue of *Commodore User.* We have taken the opportunity of the Commodore Show to incorporate the Official Show Catalogue in the new magazine before our official launch on the newsstands: that gives you the chance to see what we'll be doing, and it gives us the chance to sort out the look and content of *Commodore User* for the future.

From the Autumn you'll be able to buy *Commodore User* every month at bookstands and newsagents as well as on subscription. The cover price will be 85p. We are printing around 70,000 copies of each issue and we're aiming for an average of between 60 and 120 pages.

Commodore User will incorporate *Vic Computing,* of course, and existing subscribers will find their subs honoured with the new mag; and we'll be extending the coverage to include the other current and future Commodore machines — like the hand-held computer, the portable 64, whatever replaces the Max, and so on.

Launching a new magazine is always a gamble. But we know *Commodore user* will be filling a need: and we're sure that we will produce the kind of magazine you will *want* to read. With your support and our confidence *Commodore User* will be not only one of the most *useful* publications on the newsstands but also one of the most successful.

Dennis Jarrett
Editor

DIGITMASTER



Now Jentech Services bring you the Digitmaster. A highly advanced Micro computer aided draughting system. Versatile, flexible and developed to handle a large range of design functions.

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New to Commodore users

Beating Lisa

The computer press and the nationals too have gone into orgasmic overdrive on the Apple Lisa, an $8,000+ 'personal computer' for big-company executives that features a built-in filing system, lots of on-screen symbols that you 'point' to with the cursor instead of typing commands, and a cable-attached 'mouse' that actually moves the cursor.

Well, it looks as though Commodore has an equivalent system up its sleeve: and looking at the way the 64 is being sold so heavily as a low-price competitor for the geriatric Apple II, the Lisa equivalent could well be a most cost-effective alternative.

Few official details are available. But a price of $4,000 is being bandied about; and from what we can gather, the specification will almost certainly feature a housing similar to that being supplied on new 8000-series Pets and the 700, with the built-in floppy disk drives — but one of them will probably be a Winchester, one of the new generation of 'low-profile' (which means 'flattish') hard-disk units.

Inside the thing there will be one processor running the CP/M operating system and a second one providing a degree of compatibility with existing Commodore programs. That latter will probably be the 6509 chip as used in the 700 (it should be able to run programs from the 64 and 8000 as well).

The CP/M-oriented processor could be a Zilog Z80A, which means you'll get the eight-bit version of CP/M — and there are literally hundreds of CP/M-80 programs around. But in view of Commodore's link-up with Zilog, it's more likely to be the 16-bit Z8000 — in which case we'll see CP/M-86 (or a version of it) with the much more powerful programs that are available for it.

Portable 64

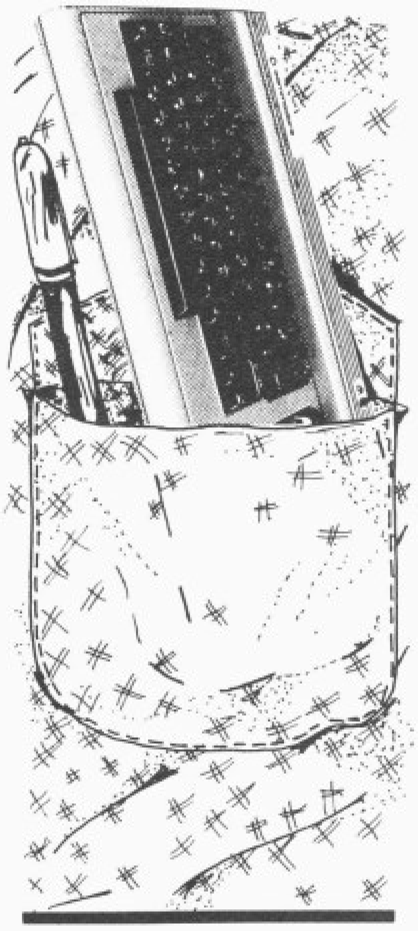
Coming soon — the Osborne alternative! Commodore's first portable computer is a 64 in a carrying case. It is currently named the SX-100, though that might be changed: and production is apparently under way already, though not more than a few thousand of them will be built this year.

The internals are the standard Commodore 64 (including the SID chip) — but of course it's the external packaging that is of more interest. The SX-100 comes as a box 125mm high, 370mm wide and 370mm deep: the keyboard, which is a full-size unit with 'real' keys and the four function keys too, clips on to the front. Unclipping it for use, you'll find a two-foot cable so you wouldn't have to perch in front of the thing all the time.

The carry handle doubles as a stand for the front of the box, and the upwards tilt makes the screen quite readable. When clipped together the keyboard hides the floppy disks (one or two of them — both are the 1541 drives that are now standard for the Vic and the 64) and a five-inch monitor.

That little screen isn't *too* bad, but no-one would want to look at it all the time. Fortunately there's a socket for a decent-sized display in the form of an external monitor. This is in the top of the box, where you also get the 64's cartridge slot (for more memory and/or an RS232 printer or modem converter) and an IEEE serial port (for a Commodore printer).

There will probably be three variants — monochrome screen with one disk (US price around $995), a twin-disk version, and one with two disks and a colour display (about $1,600). First shipments are promised for early this Summer, but then we should all be used to Commodore's delivery promises by now...



The mountain comes...

Coming to Mahommed: "Supplying computers at a price which people can afford is a religion at Commodore" — another pearl of wisdom from the lips of genial Jack Tramiel, boss of Commodore Intergalactic talking to a Hanover press gathering.

...Now read on: "We produce for the masses, not the classes". A snippet from *The Commodore Philosophy,* a cheery little work for Commodore employees. Author Jack Tramiel. Sounds like God and Marxism can mix...

...And again: Oh no, not more of it? "Business to us is not a sport. It's war!" Also from the *Philosophy.* And it goes on: "Treat every penny as your own". Hmm. Interesting philosophy, this, that manages to combine religion, socialism and Mammon so effectively with Samuel Smiles. (Vicarious thanks to Guy Kewney, who reported this lot in the ace trade paper *Micro Scope.)*

Anti-hire

The new Computer Trade Association says it will "represent the interests of all sections of the industry: retailers, distributors, software houses, manufacturers and consultants".

And what's it for? "The Computer Trade Association is pledged to achieve a professional code of conduct to govern dealings both within the Trade and between the Trade and the Public; legal clarification of the current uncertainty of computer software copywight; to fight software piracy; and to help co-ordinate member interests at major exhibitions. But the most important campaign that the Association has so far initiated is the control of the rapid growth of unauthorised software libraries..."

Or to put it another way, "The Association is opposed to any form of hiring or lending of tapes, disks, cartridges etc by direct or indirect means, without authorisation from the author, his or her agent and publishers".

Existing members of the Association are Atari, Buffer Micro Shop, Bug-Byte, Camputers, Grundy, Silversoft, Tandy and Virgin Games.

Easy price

A company called Viza Software has two brand new products for the Commodore 64. VIZAWRITE claims to be "not just another microcomputer word processor, it's the real thing, just like the ones with the £5,000 price tag... You've heard this before but this time it's true..." VIZAWRITE is £69 plus VAT.

VIZAWRITE claims to offer "all the usual word processing facilities — nothing really out of the ordinary, it's not supposed to be — but what we can't show you on paper is how easy to use it is, and how sensible and powerful the commands are'. Sounds ok to us.

The new Commodore 64 is the most powerful personal computer available to the businessman.

And amazingly, it's one of the least expensive.

A brilliant example of micro-computer technology, it will do a lot to make your business more efficient and more profitable.

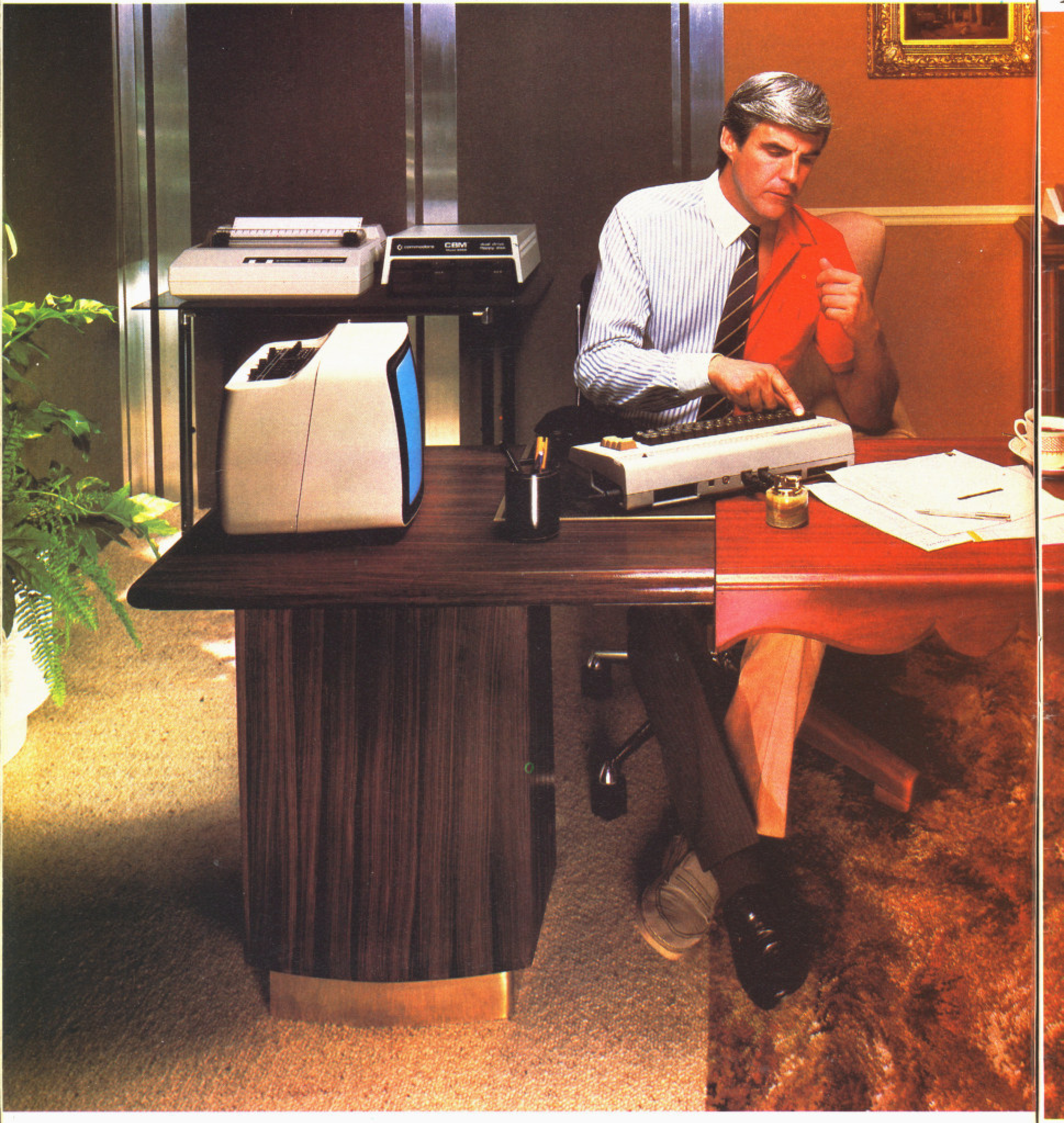
The range of software – general and specific – is very extensive, and covers financial planning, word processing, information handling and countless other business and personal tasks.

The Commodore 64 is the ideal personal computer for the office. It is also ideal for the home, whether this is your 'second office' or main place of business.

It means that the scope of take-home work is no longer limited to what papers can be carried in a bulging briefcase.

A Commodore 64 at home could allow you access to all the information stored at your company office immediately, easily and with complete security, simply by linking up to any TV set or monitor.

For the office. Or the



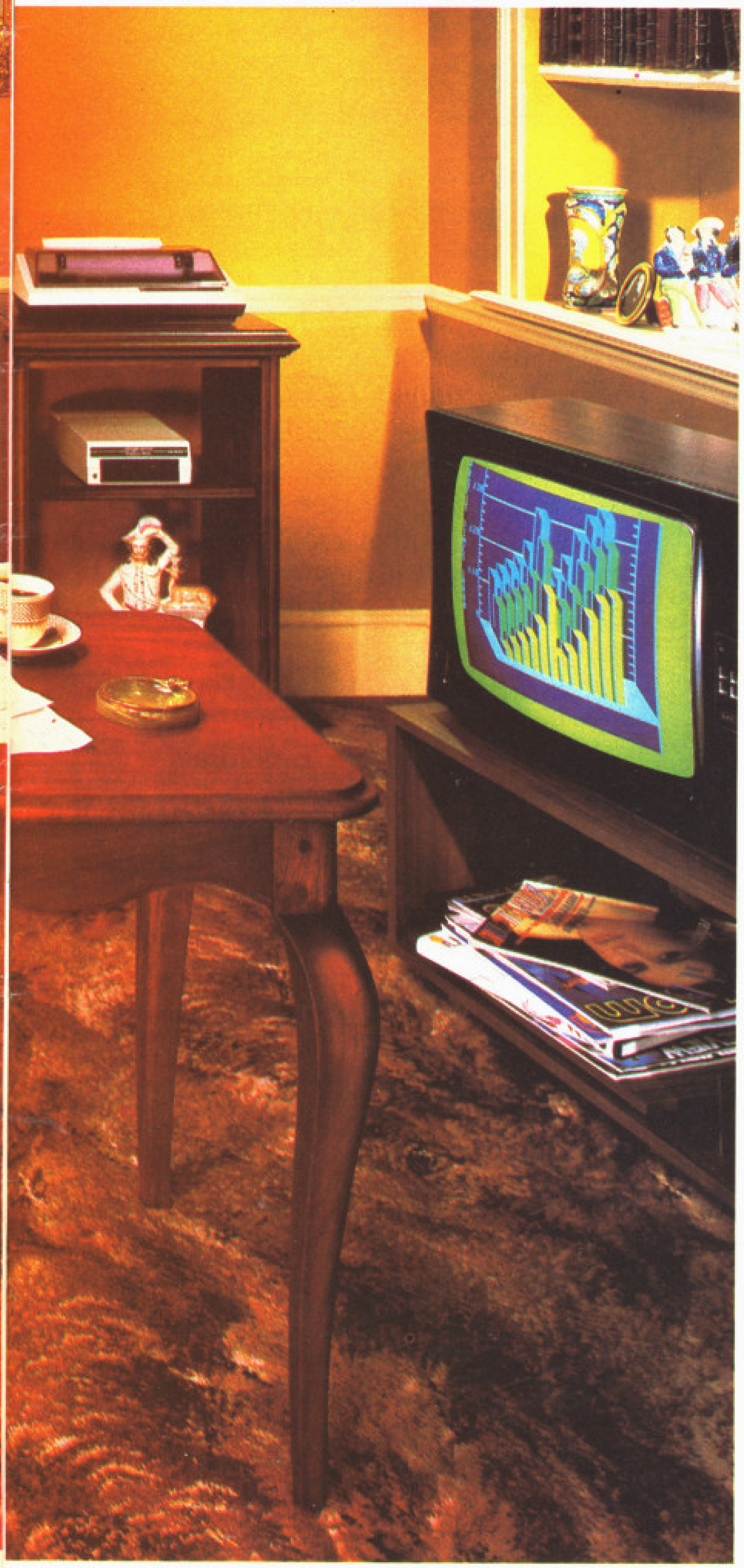
ELECTRONIC MAIL IN MICROSECONDS

You could also link up with other Commodore 64s: in branch offices, for example, or in colleagues' homes, with instant exchange of information.

You could also plug in to half a million pages of Prestel information, making use of key figures in combination with your own calculations for such statistics as you might need; or for other business uses, like car hire and hotel bookings.

The Commodore 64 means maximum flexibility,

e home office.



and provides the facts on which you can base sound business decisions.

INVALUABLE TO ANY BUSINESS

The Commodore 64 is the perfect computer for your own business, whatever its size. As well as the advantages we've already mentioned, it has a great capacity for expansion, and when combined with various peripherals** it is superbly flexible. Whether it's looking after personnel records or creating models, say, for sales forecasts, it will quickly prove to be of vital importance to any well run concern.

MORE POWER TO THE STUDENTS

A Commodore 64 in education puts more computer power at students' disposal. Subjects include maths, from basic arithmetic to higher functions; vocabulary building; elementary science; basic geography; and of course, learning computing.

FOR EVERYONE WHO HAS A HOBBY

Apart from being an absorbing and fascinating pastime in itself, the Commodore 64 can be a tremendous help in countless hobbies. It's equally happy collating recipes for a cook or choosing moves for a chess enthusiast.

In short, the Commodore 64 is one of the most outstanding microcomputers ever built. Outperforming all other computers in its class (some at twice the price), it's the ideal business partner.

And just as at home, at home.



The 64 from Commodore.

64K memory for £299.* Of its kind, unbeatable. At its price, almost unbelievable.

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For more information on the powerful new Commodore 64, and the address of your nearest dealer, telephone or write to us at: The Commodore Information Centre, 675 Ajax Avenue, Slough, Berkshire, SL1 4BG. Telephone: Slough (0753) 79292.

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To sum up, it does just about everything that all the others do, it is definitely the cheapest, and it is one that a secretary will feel more at ease with on a first encounter."

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The name of this program is PAYROLL 2 and it runs on the Commodore CBM 8000 and 700 microcomputers.

It would make very great sense to ensure you see a demonstration of this remarkable program before purchasing a payroll package. It would be highly frustrating to purchase another and then become aware of the PAYROLL 2 excellence afterwards.

The price for transforming your payroll days is £375. The hardware, if you don't possess it will cost round £2300 (prices subject to VAT).

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SUPERIOR PROGRAMS FOR THE CBM PET

The Tale of Teenage Software Millionaires

the truth behind the hype

by Adrian Jones

Would you care to make some money from your computer? There's an awful lot of software out there for 'home' computers. We asked Adrian Jones to find out where it's all coming from — and how you too can start raking in some of the rewards of being a freelance program author.



A special mission awaits me. I'm the commander of a starfleet roaming the universe searching the planets for aliens to zap. But first, I've got to go to Lasky's to get the cassette. You see, I received this Vic for Christmas and all my aggression can now be challenged into attacks on preventing or initiating seaborne Invasions and zapping the nasties.

But being a clever sod, I feel I can do better than a lot of these efforts. I mean, how many Darth Vader clones can a man take? So I've sat at my Vic for ages, and my eyes are red and my typing finger has callouses; but I've got the game written. And I'm sure there is oodles of cash waiting for me — but hold on, how exactly do I go about selling my software? What does the market want? *Is* there a market? Self-doubt taunts me. I'd like money, not an eight-inch stack of rejection letters.

I spoke to six companies who market software programs and games. All were unanimous in the view that there *is* money in writing programs; but they all said too that teenage software millionaires are few and far between — discount all the TV programmes and Daily Mail stories about thousands of 16-year-olds earning a bomb. Most of the software publishers *are* searching for new products, but you'll have to be an Albert Schweitzer of software to carry off the Holy Grail — just be content with a place at Camelot.

But you *can* make a tidy sum; and if it's something you enjoy doing, then the more the better.

The big day arrives. You receive a letter from the firm you sent your idea to. Feverishly opening the buff-coloured envelope you give them a clear impression of what he was offering. No chance. Most firms require a completed game before they can act.

All the firms I spoke to (and I presume most other software firms) get their games and programs from a mixture of in-house workers beavering away and unknown authors sending in unknown and untried games; **Audiogenic** also get a lot of its catalogue products under licence from firms in the USA.

But it looks as though more than half of the software published these days comes from *you* — the people with your Vics and Commodores sitting at home struggling with a game to make your name.

For instance, **Rabbit Software** receives 10 to 12 tapes a month, **Bug Byte** of Liverpool gets at least two a day. **Virgin Games,** since it started up three months ago with a lot of press comment and the subsequent advertising, says its mailbags have been overflowing with contributions. "We've received a helluva lot...50 per cent of the tapes received are rubbish, but there is a lot of talent around", says Nick Alexander at Virgin.

That's a lot of work and a lot of time to be told what you've either read: "Thanks, but no thanks," "great, but we'll need a few adjustments — like a joystick option" (in which case they'll let you, the programmer, do it), or sent in is useless. On the other hand — and here comes the cheery bit — games that *are* good seem to be of a very high standard. Alan Maton of Bug Byte, for instance, told me that there was lots of software talent in the North — and especially Liverpool, for some reason. And Gail Wellington at **Commodore** says that the UK in general is a good source for software programs. So, you good programmers, go for it!

Start thinking

Now assuming that you've got your game finished, you are going to send it to a software firm. How do you do it?

Well, for a start none of the firms I contacted will even look at an unsolicited piece of software *unless it come through the letterbox as a cassette.* The majority of hopefuls follow this golden rule, but a few send in scenarios or listings (which are especialy laborious).

The day I spoke to Bug Byte they'd just received a series of photographs which the sender had hoped would "brill, come in and ink the dotted line."

It's only Commodore which seems to provide any kind of any evaluation and grading system for those rejected. This seems like a good idea; you'll know where you went wrong.

Ok: there's a great grin on your face, you've been accepted. Daydreams of fame and cash swan in front of your eyes. How are you paid?

Royalties are the most common way, but the money varies with the quality of the game. Bug Byte used to do it on a straight sales basis, but that was too time-consuming and now they pay a premium on each cassette. Say they sell 5,000 cassettes of a game; the author will receive 5,000 times whatever premium has been agreed.

Virgin Games aims to give a royalty of five to ten per cent — a little lower than most firms, who typically offer 15-20 per cent, but then Virgin calculates its 100 per cent take from the *gross* income of the product (which might mean T-shirts, offshoots etc) rather than from sales of the cassette alone.

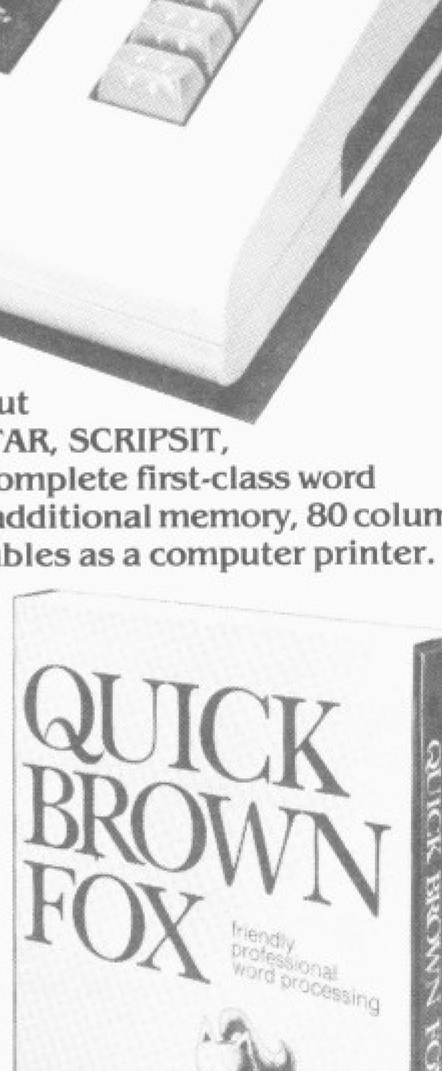
The other way in which you can gather in the copecks is by an outright sale of your game. This is usually done if you are in ▶

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desperate need of the readies: remember, you will lose a lot if your game goes on to become a runaway success. You might receive money based on an average sale of 5,000 and the game will actually sell 15,000.

Commodore uses the outright purchase approach for not-so-outstanding software, which they'll utilise for freebies, Prestel etc.

Another way in which you may gain is by receiving new equipment in lieu of royalties; this also ensures a sense of loyalty to the firm from the author — this is usually for someone of proven ability. One of Audiogenic's authors had received about £1,500 in the last year, but in addition had been given new computors and a disk drive.

Mind you Audiogenic was much more cautious in its estimation of the amount of money about in the software market, saying that some firms exaggerated the figures to be earned.

On the other hand, Heather Lamon of Rabbit Software said that some of the successful games-people will earn £4,000 to £5,000 per game — and more successful authors hve been known to go to £15,000. So the moral must be to go into this business with your money sense intact and your common-sense in tow.

How many? How long?

The first production run of a game will vary. Bug Byte launches a new program with a run of 3,000 copies, Rabbit produces 1,500-2,000, Commodore might have 3,000 to 5,000 for the UK (but then Commodore also looks for worldwide rights). Virgin also begins with 5,000, but they say they aren't interested in anything which cannot ultimately sell 10,000 copies or more.

Take Commodore's bestseller at the moment, *Blitz;* "it's easy to operate, nice and clean. . . and it was sent in," says Gale Wellington. It's also original and clever.

Forget about copies of already-existing arcade games: concentrate on originality combined with a high degree of interest for the user, variation and good colour. Virgin asks that adventure games be fast-moving, though the people

Lifespans vary; Mark Eyles at Quicksilva told me that since they entered the market about two years ago, *all* their programs are still selling. On the other hand, Gale Wellington at Commodore reckons the life of a Vic program averages about nine months — but "good quality can keep the game selling".

With the bestsellers it's hard to say. A good example of steady selling is *Amok,* brought out on Vic by Audiogenic in December 1981 and still shifting so well that Boots orders it 200 at a time.

Generally speaking you should expect about six months to a year of selling life; with the really exceptional ones demand may continue a time longer.

Now, what would you send to the firms. Another PacMan? Alan Maton of Bug Byte told me: "If I had a pound note for every time I got sent a *Snakes* I wouldn't be speaking to you now." There may be lots of prospective games authors out there, but it's the originality which counts. Audiogenic asks that the games they receive shouldn't be just good, they should be "incredible." The punters hve become more sophisticated: they expect realistic simulations and 3-D multi-colour graphics.

On the other hand that shouldn't be seen as a licence to produce games which are so complex that only the author can work them out — and then only after half a bottle of Jameson's.

there are trying to find new ideas away from the ubiquitous 'spacies' — we hear they have one due on the market soon called *Sheepdog Trials.*

Quicksilva has a bestseller called *Trader* — it's an intergalactic adventure (you know the sort, lots of moving around moons, dodging aliens etc) and also little bits of arcade influence; but most of all it's orginal (which is vital) and blessed with good graphics (which is important). It's also commendably witty.

Bug Byte again emphasises originality plus smoothness. People must be able to play it again and again. It must not halt on a high score, either, otherwise the punters will lose interest rapidly.

Artwork for the packaging (which the companies of course prepare) is generally seen as crucial, and the competition is "hot" (the words of Nick Alexander at Virgin). People will buy the game on the strength of what they can see on the shelves of WH Smiths.

If you want to be a *bona fide* star, we'd recommend you go to Virgin Games. They intend not only to feature the author's name on the back of the package but also to print your mugshot and a few words about you. Microcomputer software's first media stars! When you thought all games' authors were boffin-type wallies beavering away at their Vics, here comes the new breed.

Perhaps they'll also jazz up the instructions on the backs of packages. Too many of them veer towards an inexplicable campness: "Whatever happens, you will be remembered as a space hero of our times!" All that's needed is Kenneth Williams to complete it.

Games take up the largest part of the software market, but all the firms I spoke to dabble to some extent in other aspects of software. Rabbit Software is currently keen on a new business program called *Infomast* — basically a programmable filing cabinet for records like names and addresses. Quicksilva has a program called *Magic Window,* a clever character generator. Bug Byte is thinking of gong into the educational market, but on the whole they want to leave it to the specialists.

Amongst those I spoke to, Audigenic seems to have the strongest stake in *all* things software. It sells utilities, machine code monitors, chess games, educational games and arcade games.

Commodore also has a variety — including a series of educational games which have very good graphics, and a number of business-oriented packages. Education? It was pointed out to me by Gale Wellington that a child is more likely to learn multiplication if on getting the sums right he or she gets to sink a pirate ship.

Tips

Finally, I asked what rules should any aspiring author follow on the road to the top.

Everyone told me that *originality* was obviously of great importance; but so is the game *idea* — people must be able to play it and to enjoy doing so: at Rabbit I was told that the company received some brilliant games that don't appeal to the public and therefore won't sell.

Everyone told me they didn't need any more *PacMans* and *Froggers.* "*City Bomber* may be popular," said Nick Alexander at Virgin Games, "but there are already three versions on the market."

Quicksilva though said that if it received an excellent version of an existing arcade game, it probably would be bought. People want 'over the top' graphics ("they love it" — Mark Eyles of Quicksilva), they want sophistication, and most of all they want to know they're not wasting their money.

You should also call a few friends in before you submit anything they can have a go and hopefully tell you what familiarity has hidden from you.

As for programming the Basic language is OUT — except possibly in adventure games. Machine code is now the norm.

▷ And chose your supplier with some care. Heather Lamont at Rabbit Software: "An awful lot of games aren't good. People usually do them as a sideline. People who write the programs can't sell them and that's where companies like us come in by marketing them." Audiogenic had this point to offer: "deal with reputable companies and don't be blinded by hype".

Step this way, Sir

So maybe you can turn your program into gold: soon you'll see whatever you've called it (not *Invaders*, please!) in Smiths, Lasky's, the pages of this magazine (being reviewed without mercy) or in a sweetshop surrounded by eager children.

Or maybe you'll get a letter telling you that what you've sent in is... well, not quite what they wanted... sorry.

But if you get accepted, there will be something. Whether it's enough to buy a new Vic, a new disk drive or if it's just a bit of spare cash, it all depends on you and your ideas — and the marketing expertise of the company you're talking to.

Our advice, in brief: come up with an original scenario, put in some clever programming to make it fast and colourful, and make sure that the punters will have enough information to play the game — and that there's enough in the game to maintain their interest.

Second, test it on some friends and/or strangers. Then look around for some prospective publishers — try the high street stores and the ads in magazines like this one to list a few you like the sound of. □

. . . And now the bad news

Devil's advocacy

by Chris Preston

So you think you've come up with a brilliant program. Everybody who has spent many nights working away at some beloved program hopes that there may be some reward other than just the satisfaction of a job well done or an admiring "Coo that's clever" from the nubile individual down the street.

Fame or (more likely) money seems to be a more powerful spur, especially as there are several firms now marketing home-grown software. Chris Preston looked into the matter, and concludes that life is not as simple as we might wish.

The first problem is simply that there *is* a lot of money to be made from a really good program, which means that all over the country there are teams of expert programmers beavering away at all the most profitable areas. A self-taught programmer working in his or her spare time is unlikely to be able to turn out a product to match that produced by the professionals.

You are also unlikely to be able to sell your program yourself (it probably calculates some abstruse mathematical formula — bound to sell thousands of copies to Physics students), with all the costs in terms of time and money which are involved.

So you have to go to Floggit & Run International Ltd. to sell the software for you, in return for which favour they will pay you a royalty of five, 10 or 15 per cent. What they *don't* tell you is that the royalty is calculated on *their* selling price. So your program, advertised at £23 a copy, earns only £2 once the VAT and retailer's mark-up have been allowed for.

The other problem is that nobody at Floggit & Run has the slightest clue how your program works. Nor have any of the dealers. So a prospective customer walking into High St. Computer Mart is faced with a salesman who says "Bose-Einstein statistics? Search me guv. Try writing a program yourself".

Manual labour

A few people who *do* buy the program are completely baffled because the manual produced by Floggit & Run has a page missing, two others in the wrong order, and four with unreadable printing. They phone up their dealers, who pass the buck to Floggit & Run, who in turn pass it on to you. Poor programmer, your phone hardly stops ringing with customers annoyed after being stalled for so long (because nobody in the computer industry admits he doesn't know the answer to a customer's question without at least three weeks humming and hahing).

At the end of the first three months you have sold 35 copies: a £70 cheque is enclosed from Floggit & Run. After the second quarter a cheque for £110 arrives.

"Great", you think. "Now it seems to be taking off! Next quarter I'll get a real big cheque!" The next quarter only 15 copies are sold, and Floggit & Run regret to inform you that they can no longer justify selling your program. The reason for the poor performance is not clear. A powerful new program from the States has made it outdated; rumour has it that the students of East Grinstead University are running off pirate copies by the thousand; games programs often fail simply because the fickle public taste has changed.

Your wonderful program has earned you all of £210, of which you will pay £80 in Income Tax and Self-employed NI Contributions. Your accountant presents you with a bill for £70 to cover preparing your accounts for the year ending April 5, 1983. Net profit for the year? £60! Hardly the stuff of which fortunes are made, is it?

Writing books is even less lucrative. They sell for much less than programs, and the royalty rates are even less. I heard a story about a Professor of Medicine who spent several years with two colleagues writing a standard textbook for his students. When it was published all the libraries and Medical Schools in the country bought a copy each and that was that. His sales amounted to about 500 copies. Total earnings for all his labours: a couple of hundred quid.

The pot of gold at the end of the rainbow is a long way away: and actually finding the start of the rainbow in the first place is a good way to go bald in frustration. □

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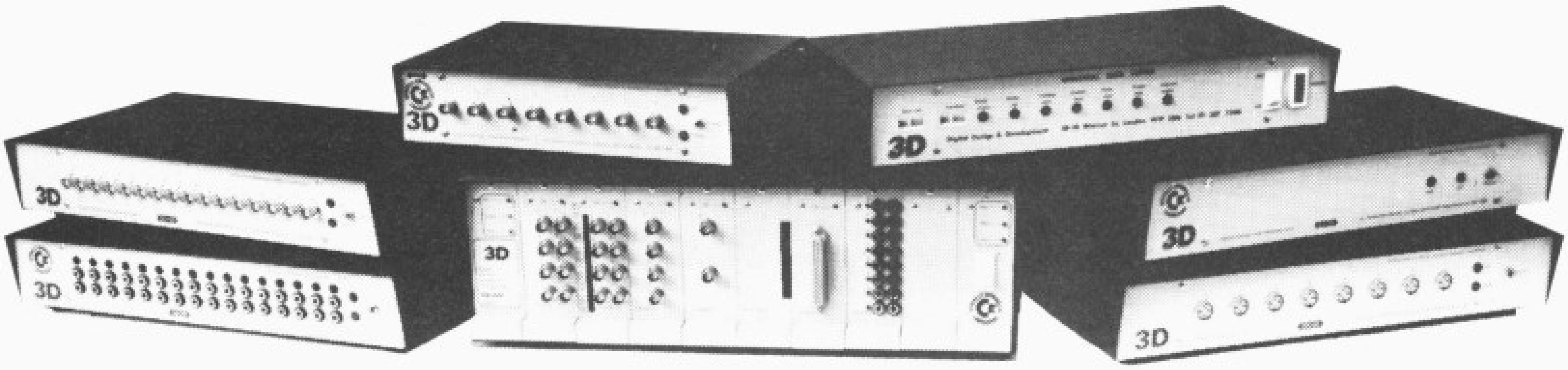
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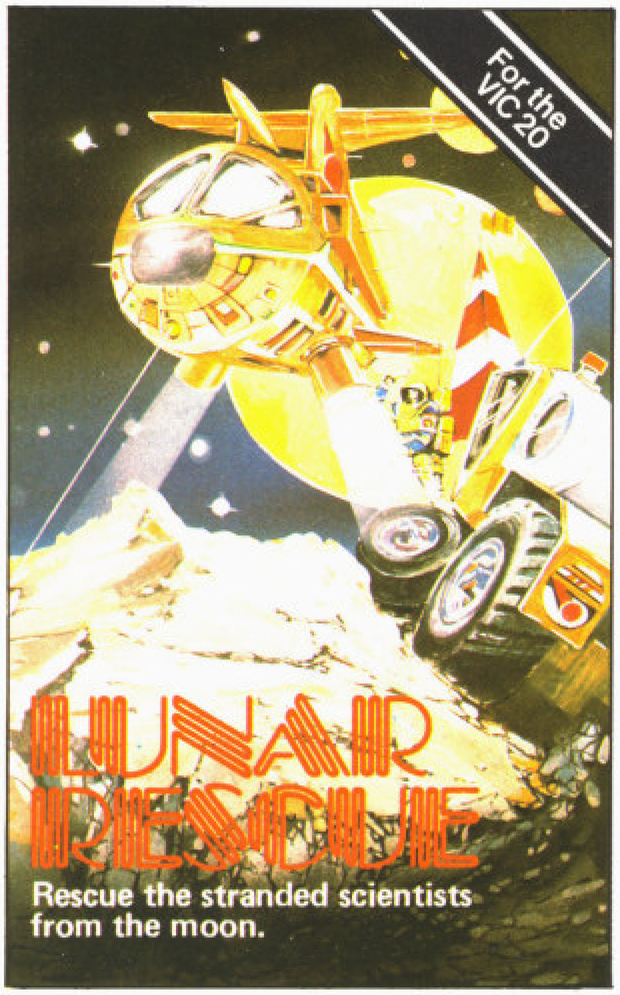
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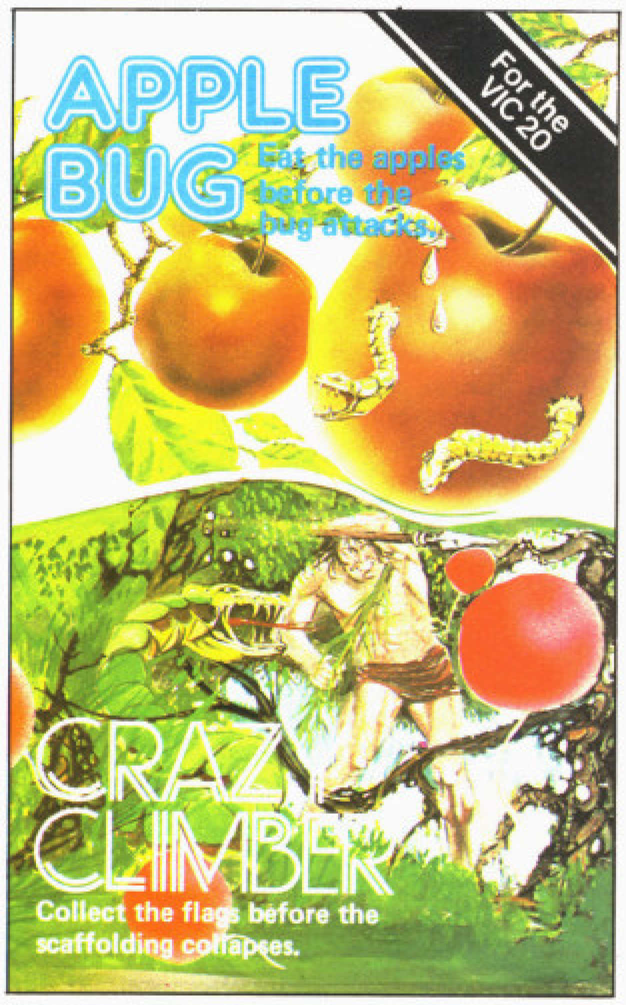
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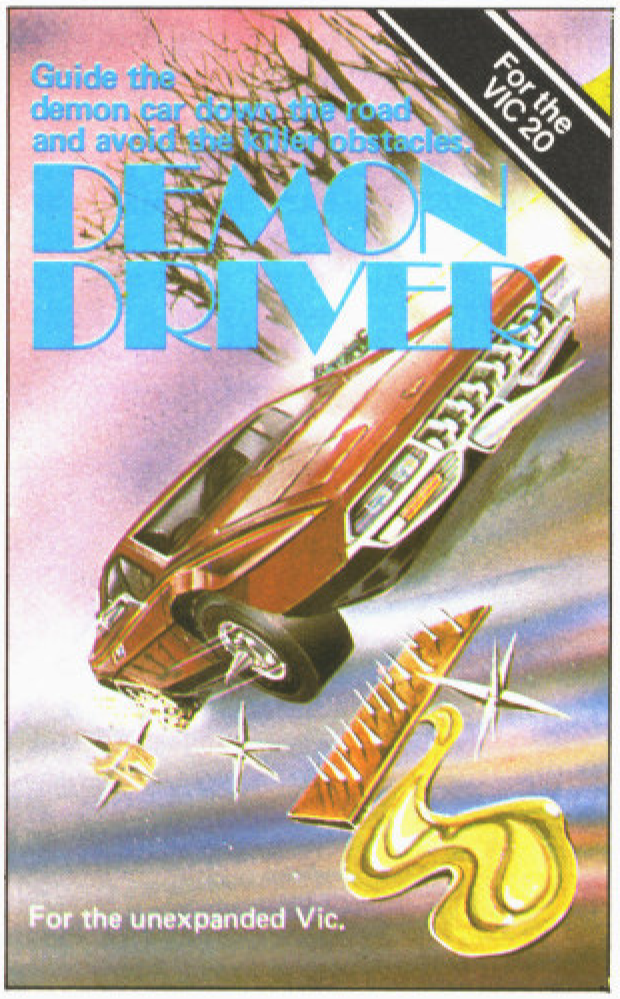
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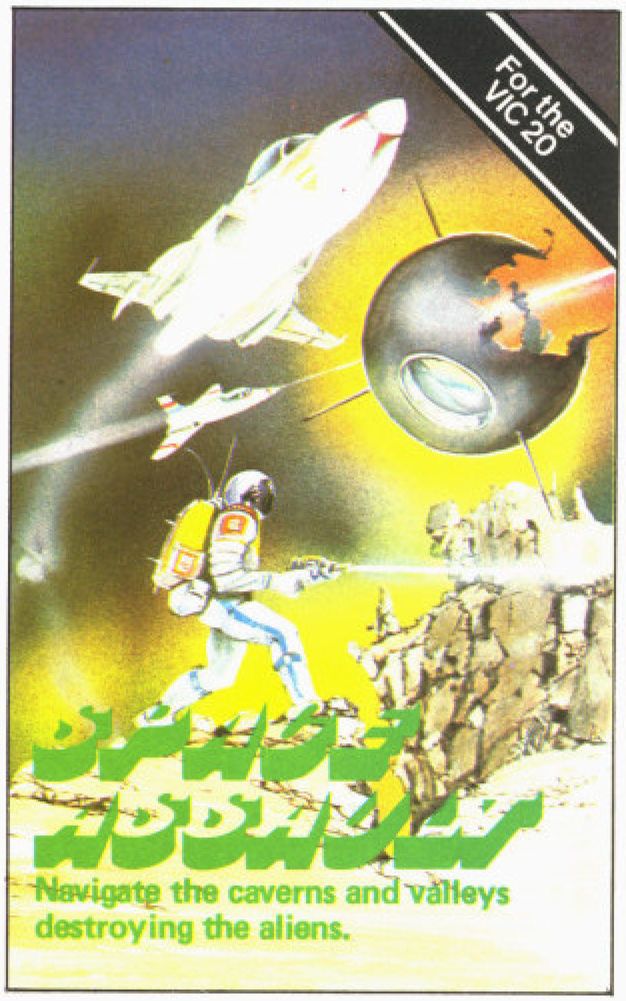
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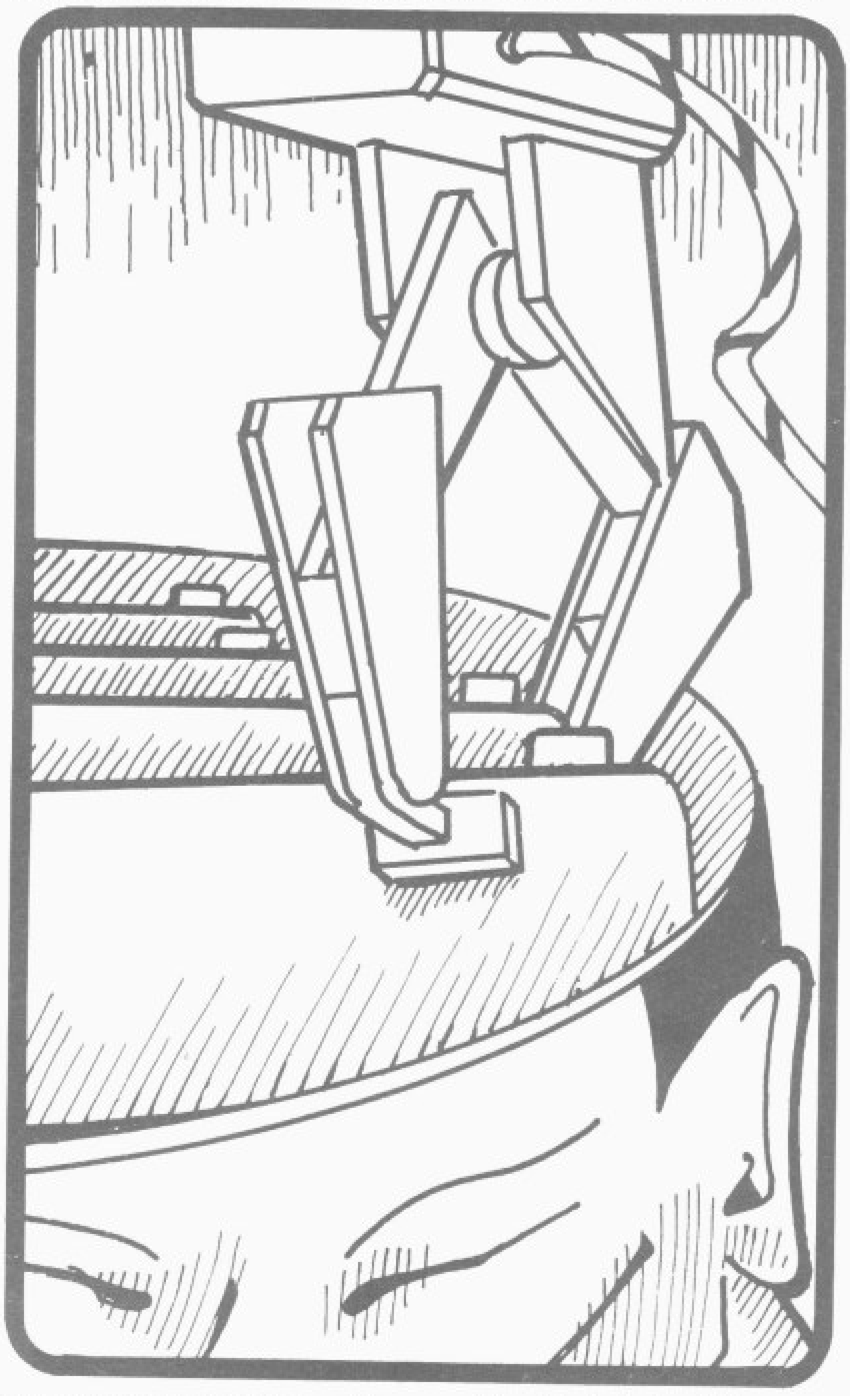
Your records on a microcomputer?

an introduction to filing packages

Maintaining records in files of various kinds has turned out to be one of the most valuable uses for a computer. In fact it's one of the most *appropriate* applications for the small computer. Files ought to be organised logically — they should be laid out in a standard format so that all records look the same: they should be arranged in a logical sequence, with a logical method of getting to particular records. And computers are good at following the kind of logical rules that will achieve those ends.

You should also be able to get at the information you need in a variety of different ways, and computers can be told to do that too — much more quickly and far more efficiently than by hand. What's more, you'll want to sort through your records and select some of them for further action: like overdue debtors in a file of sales records for a business, or all items for which you paid more than £5 in the files for your philately collection back at home. The computer can do that sorting and selection for you, and again it can do it quicker and more accurately than you can.

If you want to run a filing system on your computer you have three basic choices. You can use programs that have been specially written by you or someone else: you can buy very specific packages for a particular task: or you can look at general-purposes 'file management' or 'database management' packages.



The word 'Computer' is something of a misnomer. In practice most computers don't do an awful lot of computing — not in the sense of performing mathematical calculations, anyway.

What computers are good at, and what they are generally used for in practice, is blindly following repetitive rules very quickly. The implications of this are simple: if you have a task that can quite easily be seen as a collection of basic rules to follow, and if it is one that involves a tedious amount of effort for people to do quickly and accurately, the computer is the obvious choice.

That particularly applies to the storage and use of information. Computers can store large amounts of information in a small space: they can store it accurately and in a consistent format: they can (in theory) let you keep it up to date easily: they can (in theory) let you get at it quickly and easily, presenting all the information you'd like in the format you want.

For that (as with all tasks on a computer) you'll need some software. In that case you will need something called a 'file management' or a 'records handler' or a 'database manager'.

You *could* write a special program to do that processing, of course. But file managers are geared to the idea of working with files: a programming language makes no such assumptions, since not all programs will utilise files. It gives you instead a set of commands and rules that are more general in their application — and paradoxically much more specific in their effects, operating at a much lower level in terms of how they relate to the electrons buzzing around inside the computer.

You'd find it difficult to use a file manager package for tasks involving lots of computation on a limited amount of filed data. You'd find it virtually impossible to use such a package to handle readings being received directly from lab instruments or to control the operation of an automated production line. But nearly any programming language could be employed on those jobs.

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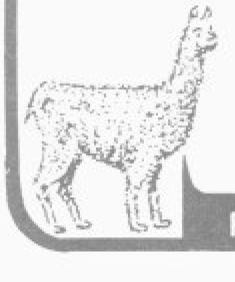
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On the other hand, if you *do* have the kind of problem that requires information to be stored in files for subsequent use, you won't beat the file manager as a way of getting up and running quickly with a computerised solution. The details of the program's operation will be much less susceptible to errors and unforseen pitfalls, since they are far more likely to be both predetermined (by the manufacturer) and tested in the field (by users).

And since the range of possible uses is known, the manufacturer does not have to include all the commands and functions you can and should expect from a general-purpose programming language. So the type of commands provided by the file manager can be much more explicit, much more relevant to the task at hand; and the terminology used can be more explicit, too, closer to spoken English.

The same arguments of course apply to other packages with a specific function — word processors and the so-called 'spreadsheet calculators' in particular. It *is* possible to use a programming language to produce programs that do the same jobs, and clearly someone did just that to write the packages in the first place.

But the advantages of those packages lie in ease of use and the speed with which you start getting useful work out of them. In view of that, it's worth making those two the main criteria when you come to select any kind of package.



What's a filing system?
At its most basic, a filing system is a program (or more likely a collection of linked programs) that allow you to set up your own format for records in a file — and to set up different formats for different files, too.

Subsequently the package gives you the facility to type information into those blank record formats; and subsequently to pick out selected records or selected items for records, including summaries of all or part of the file using selected items.

You will probably be able to decide just how such reports and summaries are to be presented on the page.

One of the attractions of the filing packages is that the principles involved are so familiar. Everyone knows what a 'file' is: it's a collection of related information, that's all.

And files consist of 'records', which are fairly obviously individual items of a like nature that will be complete in themselves (holding all the relevant information you have on a particular customer, for example) in a form that allows you to compare the information therein with the same kind of information held in other records in the same file.

Computerised files aren't quite analogous to the office filing cabinet, though. In one of those folders or suspension files you can put any kind of information that you regard as relevant to the name on the file — documents, correspondence, photographs, bills, newspaper cuttings.

The computerised system requires you to set up a much more rigid format for records, and in practice each of the file entries therefore have to look much the same.

A better analogy is with a card index, where the file consists of a bunch of individual cards (say personnel records) in more or less the same layout (name, followed by address, personnel number, date joined, current department, job history, etc) — but with the scope to add information that doesn't fit the rigid headings you've laid down, personal notes and managers' comments for instance.

Pros and cons
In short, filing packages are very flexible ways of handling the kind of information that you can keep in files. They do impose some strictures, of course.

There is normally a limit on the number of headings you can have in your record format and there may be a restriction on the amount of information you can enter against each heading.

And you usually have to get your record format correct right from the start, since you generally have to specify the format in considerable detail — how many characters you want to allow for each entry, which items on the record you'll want to use for 'sort and select' tasks, which items you may want to pluck out and use in calculations.

Once you start entering the information it's often very difficult or impossible to change the layout. So it's worth taking a good deal of care and no little time to cover all the possible options.

There will be other restrictions as well. Some packages have a maximum number of records that you can put into a file, though with many that's limited only by the capacity of your disks — and with some you can spread a file across more than one disk. Some also put a limit on the amount of information you can hold in any one record.

And with most of them, the size of the individual records relates directly to the maximum size of the file; all records have to be approximately the same

size, because they are all laid out to follow your predefined format, so if you're using a long record format you will obviously take up more disk space per record.

The fancier packages do use clever techniques to minimise that. Instead of repeating all the headings on each record stored, they will use a kind of abbreviation form that clearly takes up less space; the full expanded form of the heading will be stored somewhere else within the file in a kind of glossary, and every time you want to print or display a record the program will go to the glossary to fetch the full heading.

Another advanced technique found in some packages is what's called 'data compression'. This is a way of concatenating repeated information, usually the spaces left over when an entry doesn't fill up all the room you have provided for it in your format. In a rigidly-defined format each of those spaces would have to be stored separately as one blank character, and a blank takes up as much room on the disk as a 'real' character.

Data compression would somehow store all those extra blanks as just one or two characters — a line of eight spaces, for instance, might be stored as just two characters, with one telling the program the number and the other identifying the repeated character.

Database v files

Many of the packages that will handle files for you describe themselves as 'database managers'. In fact the term should be reserved for packages that can legitimately claim a different order of sophistication.

A DBMS (database management system) is still a software package for creating, updating and manipulating information. But it quite deliberately aims to provide an environment in which a number of specially-written applications programs can have access to a common pool of data without their needing to specify exactly how the data is stored and used.

In other words, a DBMS is designed to link with other programs: and it is designed to free the programmer from some of the nitty-gritty of data definitions. A full-scale DBMS generally requires a professional programmer to use it effectively.

This is not to say that DBMSs do not provide quite understandable and definitely useful commands for storing and retrieving information: most of them do. But their complexity tends to bump up the effort and time required for learning, and their sophistication might well be wasted on the simpler routine file management jobs.

Do not exclude consideration of a package that calls itself a DBMS — not all self-styled database managers actually qualify for the description above, after all. But be prepared for the implications of using one!

What can you do?

So far so good. You've bought a filing package because you want to set up files. But you also want to get at those files, to *use* them. What kind of facilities will the package provide?

• Setting up records

For a start, the package will set up records. That is a fairly obvious point, but it is worth making. The computerised system will impose order on your record-keeping. It will force you to decide what kind of information you want to hold; and it will force (or at least *encourage)* you to fill in each record with the same kind of information in the same manner.

Some of the information might be entered automatically for you. When it's required, today's date is often inserted without your having to type it. If you have an entry in your supplier's record for 'outstanding balance', say, the program might well be able to fill that in all by adding the last invoice total you put in to a current balance and perhaps subtracting what you've just keyed into the 'payment received' line.

Most file managers require that all records are identical in format and the same length. Those packages more properly called 'database management systems' may allow you more than one type of record in your files, though.

• Maintaining Files

The filing system will also maintain records and files. New records can be added as they arise: when information changes, existing records can be amended simply, quickly, accurately and *rigorously.*

Both factors mean your file should be as up to date as you can make it — and since amendments are fast and easy to do, with a defined procedure to the job, the sheer effort of keeping the files up to date should be minimised.

• Searching

Once you have your information in there you'll want to get at it. This means the ability to search for a particular record and display or print it. Typcially you will want get at a record by referencing the main subject on it, the supplier's name for example.

Or you might want to pick it out by using some kind of subsidiary information which doesn't happen to be at the top of the record layout — an abbreviated name-code or a customer number, say. Perhaps you can't remember the name, so you'll want the package to find you the record for that sales prospect in Whitehaven or the job applicant to whom you wrote on 11 January 1982.

All the packages allow you to do that, though they will usually require that you nominate in your initial setting up of the format which bits of information on the layout you might want to use for searches. These are generally called 'key' fields, a 'field' being one of the entries in a record — files consist of records, records consist of fields.

In searching through a file like this the package will typically pick up all the records that appear to fit the information you've offered. You are likely to get a screen message telling you it's found four records with a Whitehaven address and do you want to see the first of them now?

• Browsing

When you have located one record, the program will probably let you look at the next one along in the file; most will let you go back to the previous one, too.

'Next' here means the next one in terms of your specification for the file. You might have put a company name as your main header, in which case the following record will be next in alphabetical sequence. But your main header might be a filing code or a number, in which case the sequence might be alphabetical or numeric (or a combination of those).

• 'Conditional' searching

When you tell it to look for 'Whitehaven', you're giving it just one parameter for the search. In fact all but the very simplest filing packages will pick records on the basis of a combined set of different criteria. You will probably be able to say "find all records for reports and books on marketing thermocouples in the Middle East that we ordered in the past two years and which have a publication date later than 1980".

The programs do vary in just how many different criteria you can use to locate the precise record(s) you're after; and they also vary in whether they let you use what are called 'operators'. The thermocouples example strings together a collection of ANDs, and AND is one of the 'logical' operators. NOT is another; so some packages would let you add "...and which have not been taken out of

the library by anyone from this department during 1983".

OR is another useful operator, extending this particular search for instance to say "...that were produced by independent bodies within Europe or North America or Europe but not Switzerland".

A few packages can also incorporate arithmetic in the searches. Usually this means the 'greater than' and 'less than' operators, for instance to pick out all suppliers whose outstanding orders total less than £1,000.

Or you might have the program do the comparison between two items in the record itself. Say there's one entry for credit limit and another for current balance; you could tell the system to compare the two and give you a list of all customers who are running over their limit right now.

• Calculation

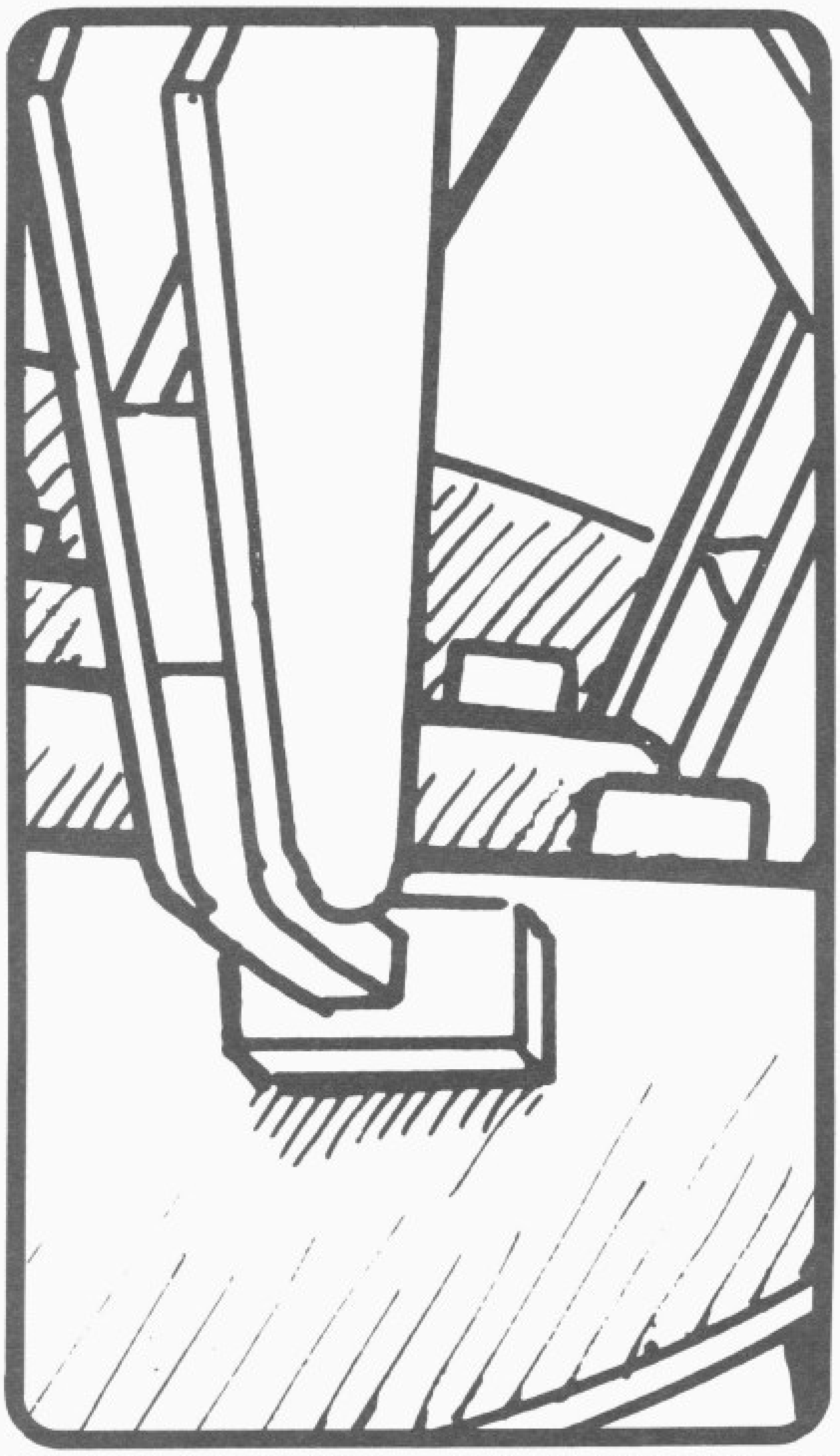
Actually performing arithmetic calculations on information held on a record is more likely to be of use to you when you want to produce reports or print something.

Not all the filing packages on offer will permit this; but those that do will let you add, subtract, divide and multiply (maybe even do exponentiation and other fancy maths) on specific fields.

This means your records might sensibly provide the basis for an invoicing system, for instance. The program can pick up outstanding customer orders from a file, automatically apply VAT and discount rates, calculate a total due, and add a note with the calculated discount for prepayment.

You might also do some arithmetic on the file for business forecasting. You could have the program go through the records to pick out all unfilled advance orders for the next year and total the lot. Or you could ask for subtotals by product group and month due.

Depending how clever the package is, your fore-



cast could include information from more than one file — sales details from the customer records, purchases from another file for suppliers, production data from a third file of your manufacturing records. Some filing systems let you do this, totalling all the relevant fields and performing calculations on the results.

• Sorting

You will almost certainly be able to have the package re-sort all or part of the file. The records might be stored alphabetically by name: you might want them sorted into a 'date of last order' sequence, or by postcode, or whatever.

You can do the re-sorting by using any key field you set up originally, and obviously you can combine sorting and selection to pick out only the relevant information.

• Pre-stored processes

Some combinations of search criteria and arithmetic processes many be used frequently. A few packages allow you to predefine these and store them separately, in effect as mini-programs, so that you can call up the sorting parameters simply and quickly or insert a standard formula easily into records or reports whenever it's needed.

• Output

Once you have extracted the information you want, you can print or display it. The trick is that as a rule you can set up the layout of this output quite independently of the way the records themselves look.

So your forecasting program can be arranged as a table with headings along the top and side and the information taken from the files inserted as numbers in the columns. Your invoice format would use the name and address fields from the record in one position and other data elsewhere on the page, adding some specific material like your standard payment terms. And so on.

The package will probably come with some predefined output format anyhow. Several have a built-in label-printing function, for instance, a layout that suits sticky labels on this continuous sheets and just takes the name and address part from the records.

• Links to Word Processors

Word processing of some kind is another option now being encountered more frequently. A couple of packages have this built in, with all the facilities you would expect from a word processing package — plus the ability automatically to insert into your text selected parts of the records in a particular file.

That of course is very useful for form letters — personalised marketing mailshots in particular, statements and running letters as well.

For that you might not need a full-scale word processor; some packages give you a cut-down text facility in the form of a letter-writing option. There you might be limited to a single A4 page of text and be given fewer text formatting functions to play with.

A few packages in any case can be linked directly with one of the commercially-available word processor packages. □


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All about assembly language programming

by David Pinless

The first in a series of several articles to lead you gently into the world of 0s and 1s.

Ever wondered if you could bridge the gap between understanding Basic and Assembly Language Programming? Would you like to be considered a cult hero by your friends who are still mastering PRINT statements? If the answer to either of these two questions is yes, then read on....

Assembly Language Programming is fascinating, but unfortunately, you cannot begin to comprehend it until you have a resonable grasp of the binary and hexadecimal number systems, which are a chore to learn. C'est la vie.

The decimal number system, with which we are all familiar, can represent a number of any magnitude by combining as many as necessary of the ten characters:

0,1,2,3,4,5,6,7,8,9.

A number larger than nine is represented by two or more characters which are interpreted according to their relative positions. For example, the characters in the number 3652 can be explained as follows:

Thousands (10^3)	Hundreds (10^2)	Tens (10^1)	Units (10^0)
3	6	5	2
x1000	x100	x10	x1
3000 +	600 +	50 +	2=3652

The binary number system, on the other hand, uses only two characters to represent any number: **0 and 1.**

A number larger than one is formed by using two more characters, so that 1010 when converted to decimal, means ten:

Eights (2^3)	Fours (2^2)	Twos (2^1)	Units (2^0)
1	0	1	0
x 8	x 4	x 2	x 1
8 +	0 +	2 +	0=10

The hexadecimal number system uses sixteen characters:

0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F.

Any number larger than (you guessed it) fifteen will require two or more characters to represent it. Consequently **5F**, when converted to decimal, means ninety-five:

Sixteen (16^1)	Units (16^0)
5	F
x16	x1
80 +	15 =95

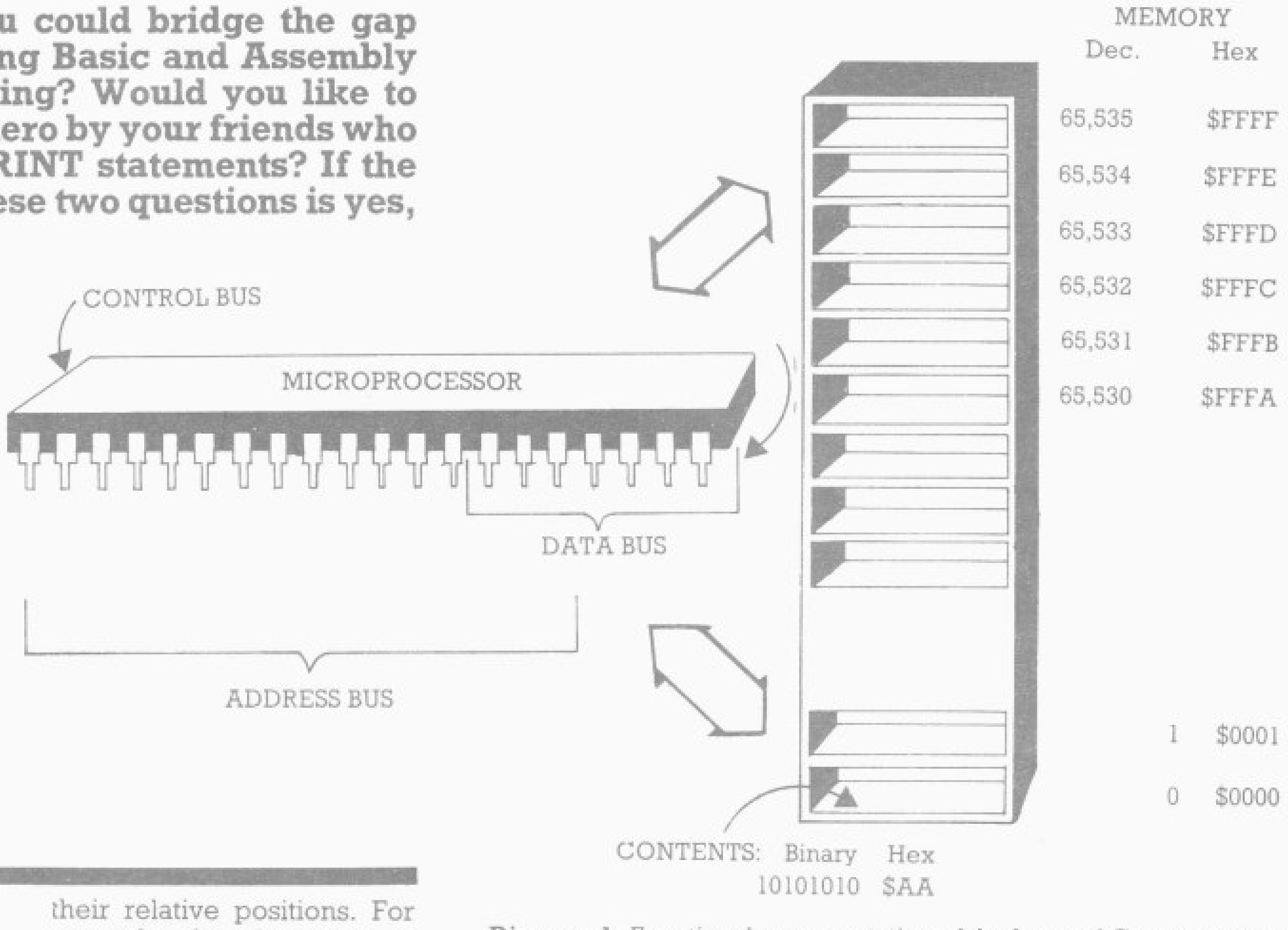


Diagram 1: *Functional representation of the Internal Components of a Vic-20.*

Page Number Dec	Page Number (Hex)	LOCATION Within Page Dec	LOCATION Within Page (Hex)	Address Dec	Address (Hex)
255	($FF)	255	($FF)	65535	($FFFF)
		0	($00)	65280	($FF00)
254	($FE)	255	($FF)	65279	($FEFF)
		0	($00)	65024	($FE00)
2	($02)	255	($FF)	768	($02FF)
		0	($00)	512	($0200)
1	($01)	255	($FF)	511	($01FF)
		0	($00)	256	($0100)
0	($00)	255	($FF)	255	($00FF)
		0	($00)	0	($0000)

Diagram 2: *The concept of dividing memory into pages.*

Decimal	Binary	Hexadecimal
1	1	1
2	10	2
3	11	3
4	100	4
5	101	5
6	110	6
7	111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F
16	10000	10
17	10001	11
18	10010	12
19	10011	13
20	10100	14

Table 1: The first twenty numbers in the three major number systems.
Note: hexadecimal numbers are often prefixed by the $ sign to distinguish them.

Having got that over with, you may care to cast your eye over Table 1 which shows the first twenty decimal, binary and hexadecimal numbers.

Now on to something more interesting. The innards of your Vic can be functionally represented, at the simplest level, by something like Diagram 1 — a microprocessor and a memory.

Innards

The microprocessor is the clever part, and the particular model in the Vic is called the 6502 (don't ask me why). This piece of electronic wizardry can understand in excess of fifty different instructions which is what Assembly Language Programming is all about.

The memory, whether it be RAM or ROM, can be imagined to consist of a large number of pigeon holes one on top of the other, each of which in the case of your Vic will contain eight binary digits (bits). These bits are in turn represented by the presence (1) or absence (0) of electric current.

The machine can only understand 0s and 1s, which might lead you to ask how it can cope with Basic; all will be explained.

The microprocessor communicates with the memory by a series of wires known as buses. One of these, the *address* bus, has sixteen wires, and is used to specify the exact pigeonhole or location in which information is stored. If you know your powers of two (given that these wires know their way by the presence or absence of current) that means the microprocessor can address up to 2^{16}= 65,536 locations.

The *data* bus only has eight wires and is used to transfer eight bits at a time (i.e. the contents of one location) between the microprocessor and memory, in either direction.

The most important wire in the control bus specifies which way the data is travelling on the data bus — i.e. to the memory from the microprocessor, or vice versa. A write operation will overwrite the contents of a memory location; a read operation merely copies the contents into the microprocessor.

Since your machine only understands binary (and binary-coded decimal as well — see next article), as if that isn't bad enough, you will be wondering why you also need to bother with hexadecimal.

The answer is pure convenience.

To illustrate this, consider the highest address in memory (65,535) and suppose it contains 11010110. The address could equally well be represented in binary (1111111111111111 — awful, or hexadecimal ($FFFF), and the contents in decimal (214) or hexadecimal ($D6). You can see that

Taking listings for Vic and 64 programs and routines direct from the printer means they come out exactly as they were originally programmed (though usually we renumber lines and add an introductory attribution).

But this obviously means too that the screen control codes, which appear in listings as symbols, have been printed as they stand . . . and this can cause you more than a few problems. You often have to look up the symbol in the computer's handbook to find out what it means. And the standard unit's not exactly the world's most *precise* printers; it is sometimes difficult to decipher exactly *what* the symbol in question is.

So all our programs have been run through a conversion program that substitutes for the screen control codes a more intelligible set of commands. These you'll find in square brackets within the listings.

When you see . . .	It means . . .	You type . . .
[HOM]	Cursor home	HOME
[CLR]	Clear screen	CLR (shift+ HOME)
[INS]	Insert	INST (shift+ DEL)
[CUP]	Cursor up	↑
[CUD]	Cursor down	↓
[CUL]	Cursor left	←
[CUR]	Cursor right	→
[BLK]	Switch to black	CTRL+1
[WHT]	Switch to white	CTRL+2
[RED]	Switch to red	CTRL+3
[CYN]	Switch to cyan	CTRL+4
[PUR]	Switch to purple	CTRL+5
[GRN]	Switch to green	CTRL+6
[BLU]	Switch to blue	CTRL+7
[YEL]	Switch to yellow	CTRL+8
[RVS]	Reverse on	CTRL+9
[RVO]	Reverse on	CTRL+0
[F1]	Function key 1	f1
[F2]	Function key 2	f2
[F3]	Function key 3	f3
[F4]	Function key 4	f4
[F5]	Function key 5	f5
[F6]	Function key 6	f6
[F7]	Function key 7	f7
[F8]	Function key 8	f8

hexadecimal is much neater, and it is also very easy to convert between it and binary.

To do so, divide the binary number into elements of four, convert to decimal and then to hex:

1101101 0101	binary
6 13 5	decimal
6 D 5	hex

Finally, let me explain the concept of dividing the memory into pages — hex comes into its own here. Imagine that the 65,536 locations are divided into 256 pages each containing 256 locations (256x256 = 65,536). Page zero will contain locations 0-255, page 1 will contain locations 256-511 and so on. Diagram 2 illustrates this with hex values. When you come to learn the memory map of your machine, and learn addressing techniques in Assembly Language Programming, this concept will prove invaluable.

The next article will delve more deeply into the mysteries of the microprocessor itself, in particular its internal registers and how it interprets binary data. The first instructions in Assembly Language programming will be presented, and you'll realise you don't have to have a degree in computer science to understand it all! □

Machine Code vs Basic

by A J Morris

If you ever doubted the efficacy of machine-code programming, just try this clever little demonstration of its speed on the Commodore Vic-20.

This program demonstrates the times taken to print the 255 ASCII characters on the Vic's screen. The idea came to me while reading **Vic Revealed:** the chapter on machine code suggested that it runs over 100 times faster than Basic, so I decided to try and prove it.

Included at the end of the chapter is a program to print the full ACSII character set. I have had to modify it slightly to print the characters from the top left hand corner of the screen onwards (POKE location 7680 + 255) rather than printing at POKE location 7935 – 255 *towards* the top left of the screen.

The results? The time taken is between one and two 60 ths of a second for machine code compared with three to four seconds for the equivalent Basic routine — and that is certainly over 100 times faster.

I hope this article will prompt other Vic-20 owners to consider machine code as an alternative language to Basic, perhaps with the aim of faster action games or subroutines etc. Using a Basic loader routine to place machine code into the Vic's cassette buffer (192 bytes maximum) is a good starting point to teach yourself machine code on the Vic, incidentally — use SYS 828 with this method. □

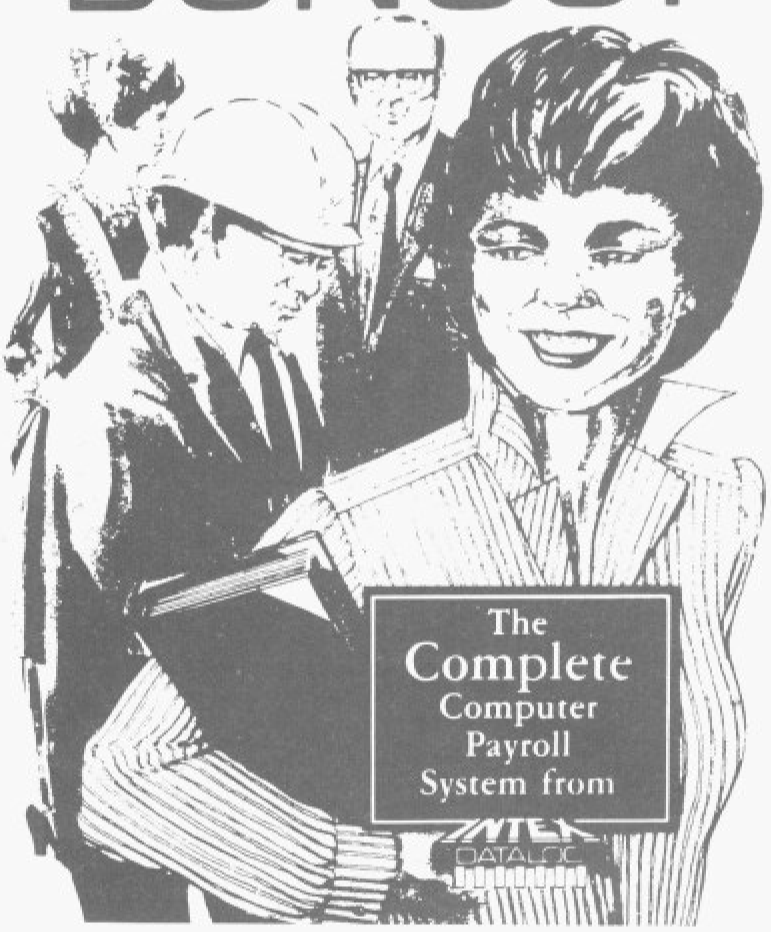
Source Program		Comments
LDA	#0	Set up character value
STA	$0340	Initialise 'CHAR'
LDX	#0	Set Index Reg=0
LDA	$0340	Get 'CHAR'
STA,X	$1E00	Store at start of video RAM + index
LDA	#2	Set colour to red
STA,X	$9600	Store colour in colour RAM + index
INC	$0340	Put next ASCII character in 'CHAR'
INX		Point to next screen location
CPX	#0	Location — last character?
BNE		If no, repeat until done
RTS		End

Source Listing

Address	Mnemonic	Hex	Decimal
828	LDA #	A9	169
829	—	00	0
830	STA@	8D	141
831	—	40	64
832	—	03	3
833	LDX #	A2	162
834	—	00	0
835	LDA@	AD	173
836	—	40	64
837	—	03	3
838	STA@,X	9D	157
839	—	00	0
840	—	1E	30
841	LDA #	A9	169
842	—	02	2
843	STA@,X	9D	157
844	—	00	0
845	—	96	150
846	INC@	EE	238
847	—	40	64
848	—	03	3
849	INX	E8	232
850	CPX	E0	224
851	—	00	0
852	BNE	D0	208
853	—	ED	237
854	RTS	60	96

```
10 REM *********************
20 REM MACINE CODE VS BASIC
30 REM BY A J MORRIS
40 REM *********************
50 REM TITLE
60 PRINT"[CLR][RVS]                    ";
70 PRINT"[RVS]    DEMONSTRATION      ";
80 PRINT"                      "
90 PRINT"[CUD][CUR]ASCII CHARACTER SET[CUR][CUD][CUD][CUR][CUR]TO BE PRINTED USI
NG"
100 PRINT"[CUD][CUD][CUR][CUR]FIRST-BASIC"
110 PRINT"[CUD][CUD][CUR]SECOND-MACHINE CODE"
120 PRINT"[CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR]PRESS ANY KEY":POKE198,0:
WAIT198,1:POKE198,0
130 REM BASIC ROUTINE
140 REM ZERO CLOCK
150 PRINT"[CLR]":TI$="000000":FORX=0TO255:POKE7680+X,X:POKE38400+X,2:NEXT:T=TI
160 PRINT"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR]
[CUR][CUR][CUR]TIME TAKEN[CUD][CUR][CUR][CUR][CUR][CUR][CUR][CUR]"T"SIXTIETHS[CU
R]SECOND";
170 PRINT"[CUD][CUR][CUR][CUR][CUR][CUR]OR"INT((T/60)*1000+0.5)/1000"SECS."
180 PRINT"[CUD][CUR][CUR][CUR][CUR]PRESS ANY KEY[CUR][CUR][CUR][CUR][CUR][CUD]TO
 SEE M/C EQUIVALENT":WAIT198,1:POKE198,0
190 PRINT"[CLR]"
200 REM LOAD M/C IN
210 REM CASSETTE BUFFER
220 FORI=828TO854:READX:POKEI,X:NEXT
230 DATA169,0,141,64,3,162,0,173,64,3,157,0,30,169,2,157,0,150,238,64,3,232,224,
0
240 DATA208,237,96
250 REM ZERO CLOCK
260 TI$="000000"
270 REM RUN M/C ROUTINE
280 SYS828
290 PRINT"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR]
[CUR][CUR][CUR][CUR]TIME TAKEN[CUR][CUR][CUR][CUR][CUR][CUR][CUR][CUD]"TI"SIXTIE
THS SECOND"
300 PRINT"[CUD][CUR][CUR][CUR][CUR][CUR]OR"INT((TI/60)*1000+0.5)/1000"SECS."
310 PRINT"[CUD][CUD][CUR][CUR][CUR]RUN AGAIN ? (Y/N)"
320 GETA$:IFA$=""THEN320
330 IFA$="Y"THENRUN
340 IFA$="N"THENPRINT"[CLR][CUR]SWITCH VIC-20 'OFF'[CUR][CUR][CUR][CUD]TO CLEAR
M/C ROUTINE":END
350 IFA$<>"Y"ORA$<>"N"THEN320
```

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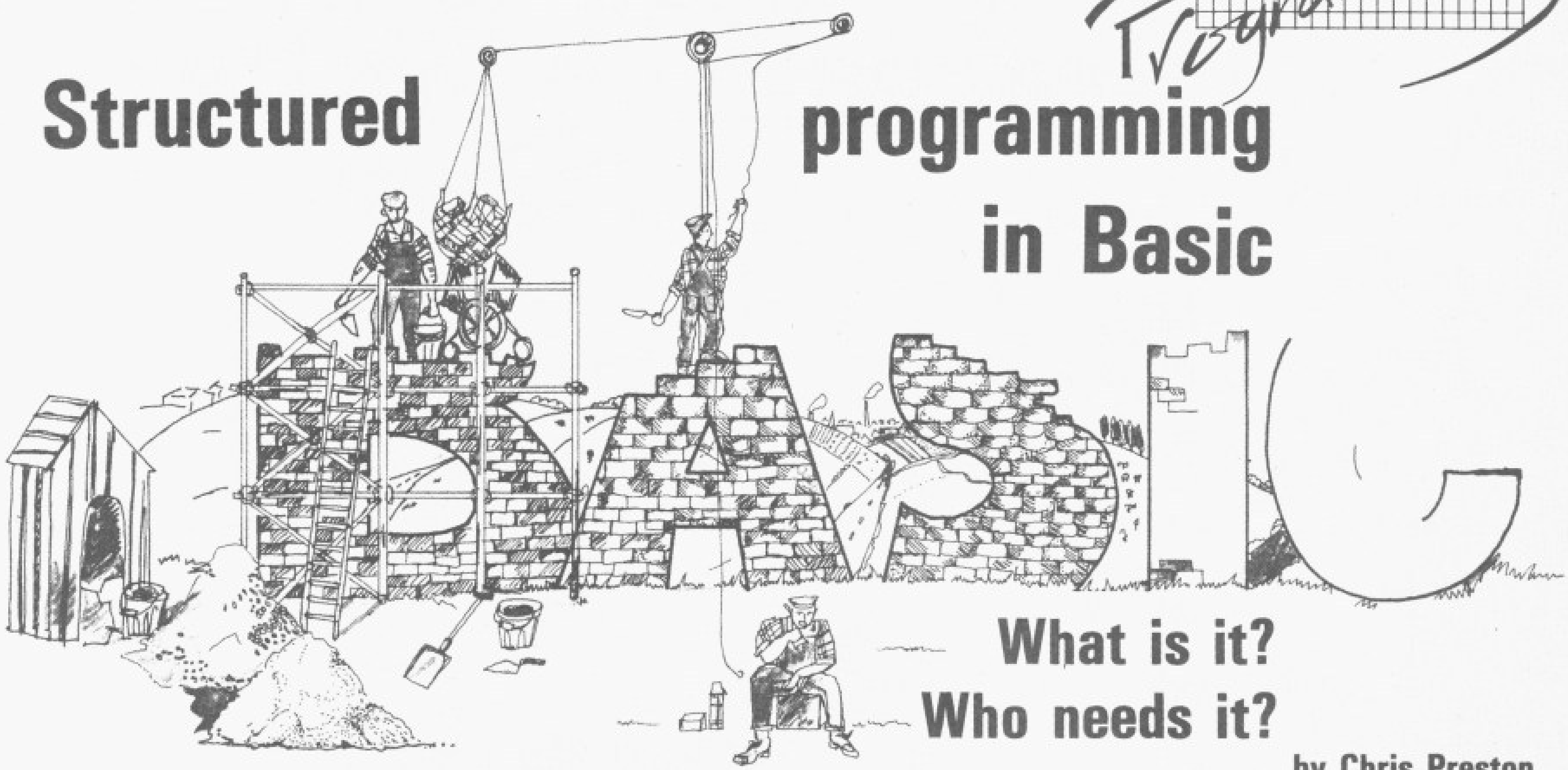
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Structured programming in Basic



What is it? Who needs it?

by Chris Preston

The problem with Basic is that it's too easy. You don't have to do too much thinking before you can get started on writing your program; and this means it's tempting to do your thinking actually while you are writing. So you can add new steps as they occur to you. If they don't fit in the sequence of instructions that you happen to be working on at the time, you've always got the mighty GOTO statement: that can switch the program away to some other point where you can put the addition. Then you use another GOTO to get back to where you were.

So what's wrong with that? Well, the seductive GOTO can produce a real mess. If things aren't proceeding in a tidy, natural sequence, there is a very good chance that confusion and error will be the results. Or the program may actually run: but with all that jumping about it will be extremely difficult for anyone to understand just what is going on — and it's likely that one day you or someone else will want to amend the program somewhat, so you'll have to be able to figure it out.

GOTO is the prime example: but it isn't the only statement in Basic which encourages such sloppy and dangerous programming habits, and Basic isn't the only language that includes them.

And what's the alternative, then? Let's hear a big hand for 'structured programming'. Massive textbooks have been written on this subject: but structured programming comes down to the desirability of applying some forethought and some method to your program-writing.

'Structured Programming' is a term which is heard more and more often these days, as more trained programmers appear on the micro scene (as opposed to those who picked it all up themselves from the Commodore manual).

It is claimed that structured programming is the only correct way to write programs, and Basic is damned as being "too unstructured". Instead we are told to use PASCAL or COBAL. "Ban the GOTO statement" is another war-cry of the structuralists, one which (not unnaturally) frightens many people away from using structured programming techniques.

I do not claim to be a rigid structuralist, and many of the comments I make in this article will seem like sacrilege to more orthodox programmers. But I hope that I can tempt some readers into using some structured methods rather than writing totally amorphous programs. In fact, many of my recommendations fall more into the heading of "general good practice", especially as Basic is not a structured language.

We can split this article into two main sections. The first will look at applying structured techniques at a high level, by separating a program into distinct sub-programs and subroutines. The second part takes a close-up view of a structured program, looking at smaller program segments such as FOR-loops.

But before all this, just what *is* structured programming?

What I mean by 'Structured programming' is really just writing a program in a controlled, logical way — rather than just writing line after line of code in one long jumble. The basic idea is to make the program easier to understand, and hence easier to debug and alter.

This often means putting in extra statements, which may not be the most efficient way of writing a particular program segment: but 99 per cent of the time the difference in program speed and size is much too small to be noticeable.

It also means that the early stages of writing the program, as far as the initial testing phase, will take longer. The bonus however comes when you come to try and find out why the program just will not work, because the testing and debugging then will take much less time than before.

Getting started

The first stage to writing a structured program (as ideally, for any other kind) is planning and flowcharting. Even at this stage, we should be thinking in terms of 'blocks'.

If we are writing a Space Invaders game, for instance, one 'block' might be to draw an alien on the screen. We would write this as a subroutine, which is called by the main program and takes two parameters X and Y that specify whereabouts on the screen the alien is to appear. In a more complicated subroutine we might have extra parameters specifying the alien's colour and shape, perhaps.

In this case most people would use a subroutine to draw the alien away: it is an operation which is going to be repeated many times in the program. It is often good practice though to put things into subroutines even though they only occur once in the program. This procedure has many advantages:

- **The operation is moved out of the main program and so does not clutter things up** — which makes it easier to follow what is happening.

- **The operation may be quite common even though it is only used once in any particular program.** A typical example is inputting and validating a date. The subroutine can then be stored separately in a 'library' and merged into programs as and when required.
- **It is surprising how often 'once-only' blocks in fact turn out to be needed more than once after all!** If the block is already written as a subroutine, it is very easy to put in another call somewhere else in the program.

There are also many cases where common operations can be put into subroutines — printing a line on a printer, for example, or opening a disk file. In fact, some people say that **all** input and output should be done as subroutines!

If all printer output is done by means of a single subroutine, it is easy to change this to make a change such as redirecting all the output to the screen or a disk file for testing purposes. Similarly, a disk output subroutine can easily be changed to put all disk output on to the screen.

We must be careful not to go too far in this. I once saw a stock control package produced by quite a respectable company, where the 'main' part of the program was simply this:

```
1000 GOSUB 20000
1010 GOSUB 21000
1020 GOSUB 22000
1030 GOSUB 23000
1040 GOSUB 24000
1050 GOTO 1010
```

Not really structured programming!!

Still on the subject of subroutines, it is a good idea always to make sure every subroutine has only one RETURN statement even if this means that you have to add some extra GOTO statements. For example we should replace this:

```
1000 A=1 : RETURN
1010 .......
1020 .......
1030 RETURN
```

with something like:

```
1000 A=1 : GOTO 1030
1010 ......
1020 ......
1030 RETURN
```

This is because it often happens that we want to make something happen *after* the current subroutine has finished, increment a counter say. If the routine has only one exit, it is easy to add an extra line. It is not so easy if there are half a dozen scattered all over the place.

In the above example we could add a statement simply, making the end of our subroutine:

```
1030 PL = PL + 1 :
  RETURN
```

These days many new micros which offer disk drives have some sort of 'chaining' facility which allows you to move from one program to another without losing all your variables. But even for those that don't, a well-publicised trick is usually available.

No excuses

This being so, there is no excuse for having huge programs most of which is only used once in a blue moon. Such a program should be split into smaller, more manageable chunks which load more quickly, take up less memory and so (in Basic anyway) run faster: and which are in any case easier to test than the original monster. Remember what happened to the dinosaurs?

So if large parts of your program (such as file creation) are used only rarely, put them into a separate program.

Once you have done this each section of your program will be quite small, so you will have lots of room for adding coment. Only rarely is lack of memory an excuse to leave out REM statements; they really are invaluable when you pick a program up again six months after writing it to make some changes. To paraphrase the TV advert "Don't cheat on the REMs!".

Structuring in practice

Now we come to the second part of the article, looking more closely at how we actually write structured code.

This is the bit which is difficult in most Basics, which lack WHILE and REPEAT statements and where the IF statement is limited to a single line. Structured life is much more simple if you can write **IF A = 15 THEN** do some code **ELSE** do some other code and finally **PRINT A.** But most Basics insist you do something like this:

```
1000 IF A<>15 THEN
     1200
1010 .....
1020 .....
1030 GOTO 1400
1200 .....
1210 .....
1400 PRINT A
```

The only firm advice which can be given is to THINK about your blocks. Very often a complicated group of IF statements can be simplified by changing the conditional. Take this simple example:

```
1000 IF A=15 THEN
     GOTO 1200
1100 PRINT A
1200 .....
```

It could become:

```
1000 IF A <> 15 THEN
  PRINT A
1200 .....
```

This brings us to the thorny problem of the GOTO statement.

Goodbye to GOTO

In making that structural change, we got rid of a GOTO statement in the action part of the IF statement in line 1000. Some programmers would say that a program should not contain *any* GOTO statements at all, and that computer languages should not allow such a statement!

Personally I think this is not feasible in Basic. But it is certainly true that if you write your code in a logical way you will find that you use fewer GOTO statements; so this is a sort of test as to how 'good' your program is.

Still, I wouldn't bother spending all night just trying to get rid of one more GOTO — unless you just happen to like hard work of course!

As mentioned above, it is a good thing to make sure that each subroutine has only one RETURN statement: similarly, each FOR-loop should only have one NEXT statement. It does make the thing a lot easier to understand, and it is also simpler to add in another statement before the NEXT if there is only one of them. Also, there is always the chance that you will want to transfer the program to another version Basic which only allows one NEXT for each FOR.

One of the fundamental principles of good programming of any sort is that you do not try to do everything by the quickest/shortest/most awkward way you can find. This sort of thing always sets my teeth on edge:

```
100 X = Y - (Y=15)
```

What is wrong with saying:

```
100 IF Y=15 THEN X=X
  + 1
```

If you forget about making each statement or loop as fast as possible and concentrate instead on arranging them *logically* — which often means *simply* — you will find that your programs are much easier to debug and update.

Once the program is fully tested, then you can start looking at bottlenecks; and there you may have to sacrifice a bit of readability in order to make the program perform respectably.

But in almost all of the cases where you have a choice between an *efficient* way and a *readable* way, your choice will have no noticeable affect on the program speed. So why worry about it? Write clear, logically laid-out programs, and you will save more time in program development than you lose in running a program which is maybe 0.05 per cent slower. □

Calc Result™

3-D Budgetting out of this world

Spread sheet programs have been available for a number of years. The knowledge and experience gained through the use of these led to a demand for a tool that is easier to use, easier to understand and more powerful than contemporaries. The result is Calc Result — a powerful yet low cost '3D' spread sheet for the Commodore 8000 and 64.

* Three dimensional format
* Up to 32 pages with consolidation
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* View part of up to 4 pages at one time
* Powerful editing facilities
* Compare budgets with "What if . . ." facility
* "if . . . then . . . else" choice of calculation
* Graphics output on screen and printer
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* Multi user capabilities and hard disk support
* Ability to load VisiCalc™ files

Machine capability

CalcResult is currently available on Commodore Business machines as follows:

8032 and 8096 computers — including the SK series — on 8250 or 8050 disk units . It can also be used in multi-user situations and with Commodore 9060 and 9090 hard disks.

Commodore 64 — a single disk version for the 1541 disk unit, and serial printer.

Price

For 8000 series £149 (plus VAT)
For Commodore 64 £109 (plus VAT)



THE SPREAD SHEET

KOBRA **Micro Marketing**
PO Box 28, Henley-on-Thames. Oxon, RG9 1PF.
Telephone 04912 2512



Available from: W.H. Smith, The Xerox Stores, Currys Micro C and leading Commodore dealers.

OFFICIAL SHOW CATALOGUE

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

Cunard International Hotel, Hammersmith, London. 9-11 June 1983.

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

Cunard International Hotel, Hammersmith, London. 9-11 June 1983.

Hello and welcome to the Fourth International Commodore Computer Show. This year's Show is bigger and better than ever before. Over 100 exhibitors will be displaying their wide range of Commodore 'approved products' including the proven and established range of micro-computers and software for the business and the home.

One of the highlights of this year's Show will certainly be the UK launch of the Commodore 64 portable computer and the new Commodore 700 series business computer with CP/M and MS-DOS.

All three days are certain to be fun and filled with plenty of things to do including seminars, displays and demonstrations. Over 15,000 visitors are expected this year and over 18,000 square feet of exhibition space should easily and comfortably accommodate them!

The Commodore Computer Show is the only one of its kind held in Britain each year and represents a unique opportunity for the eager enthusiast, businessman or the whole family to discover the exciting world of micro-computing.

Yours sincerely,

Ian Slater
Show Organiser

commodore

Commodore Business Machines (UK) Limited
675 Ajax Avenue, Trading Estate, Slough, Berks SL1 4B
Telephone: Slough (0753) 74111 Ext: 220
Telex: 848403

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

How to get there

Hammersmith is in West London, of course, which makes the place pretty convenient from just about all directions except East Anglia and North East London. Driving there isn't too bad; the public transport services are excellent.

Cars

Getting to the Cunard International Hotel can appear daunting and is the subject of numerous apocryphal stories about haggard drivers circulating feverishly around the Broadway looking for a way to it. But in reality it's not too difficult.

The main hotel entrance is in Shortlands, and that's a two-way road connecting Talgarth Road and Hammersmith Road.

Coming from Earls Court and Central London you aim for the A4 and follow signs to Heathrow, Bristol etc until you reach the Hammersmith flyover . . . otherwise the next possible exit is a couple of miles further on. So get into the left-hand lane and take the side road signposted 'Hammersmith'; and at the next opportunity, turn right and make a U turn under the flyover. That puts you briefly on Talgarth Road going the other way; Shortlands is the first left.

Coming from Kensington and the West End, drive through High Street Ken and past Olympia. You're then on Hammersmith Road without trying; Shortlands is the last turning on the left before you reach the ugly kingsize roundabout at Hammersmith Broadway.

Coming from the West you stick with the A4 until you're offered the Hammersmith and Shepherd's Bush exit just before the flyover. Again, don't miss it: it's tricky to find your way back again! You follow the slip road on the Broadway, go right round the roundabout past the tube stations, and don't aim for Kensington — it might look the obvious route from the map, but there's no right turn into Shortlands from that direction. Instead take the next exit signposted 'Central London'. This puts you on to Talgarth Road and Shortlands is the first left.

Coming from Shepherd's Bush and the North you aim for the Broadway, avoid the temptation of the Kensington direction, and follow the Central London sign again with Shortlands the first left.

Car parking is in theory available at the Hotel itself — there's an NCP car park under it — but most of the space is likely to be taken by exhibitors and the Hotel's regular guests.

There are two other decent-size car parks locally: one is off Queen Caroline Street (get on to the Broadway and take the exit after the Odeon), the other is behind the new shopping precinct called Kings Mall (take the King Street exit from the Broadway and follow the signs around to it — it's about five minutes' walk from the hotel).

Alternatively you might just be lucky and find a space in some side-street. Your best bet is probably in the maze of streets just North of Hammersmith Road.

By tube

This is the obvious way to come if you live near a *Piccadilly, District* or *Metropolitan Line* station. On the Piccadilly and District Lines you look for the 'Broadway' exit from Hammersmith station, turn right past the Clarendon pub and search for the subway that gets you under the Broadway itself.

The Metropolitan Line exit is on the North side of the Broadway, so turn left and brave the traffic at the foot of Shepherd's Bush Road and try for the island of office buildings which also contains the Cunard.

Hammersmith is served by dozens of buses, too.

Leaving by cab

If you need a taxi, you'll probably find some at the hotel or will be able to flag one on the Broadway. But there is also a cab rank on the corner of Shortlands and Hammersmith Road, and there's another at the junction of the Broadway and Hammersmith Grove.

Making the most of Hammersmith

The sporting option (and others)

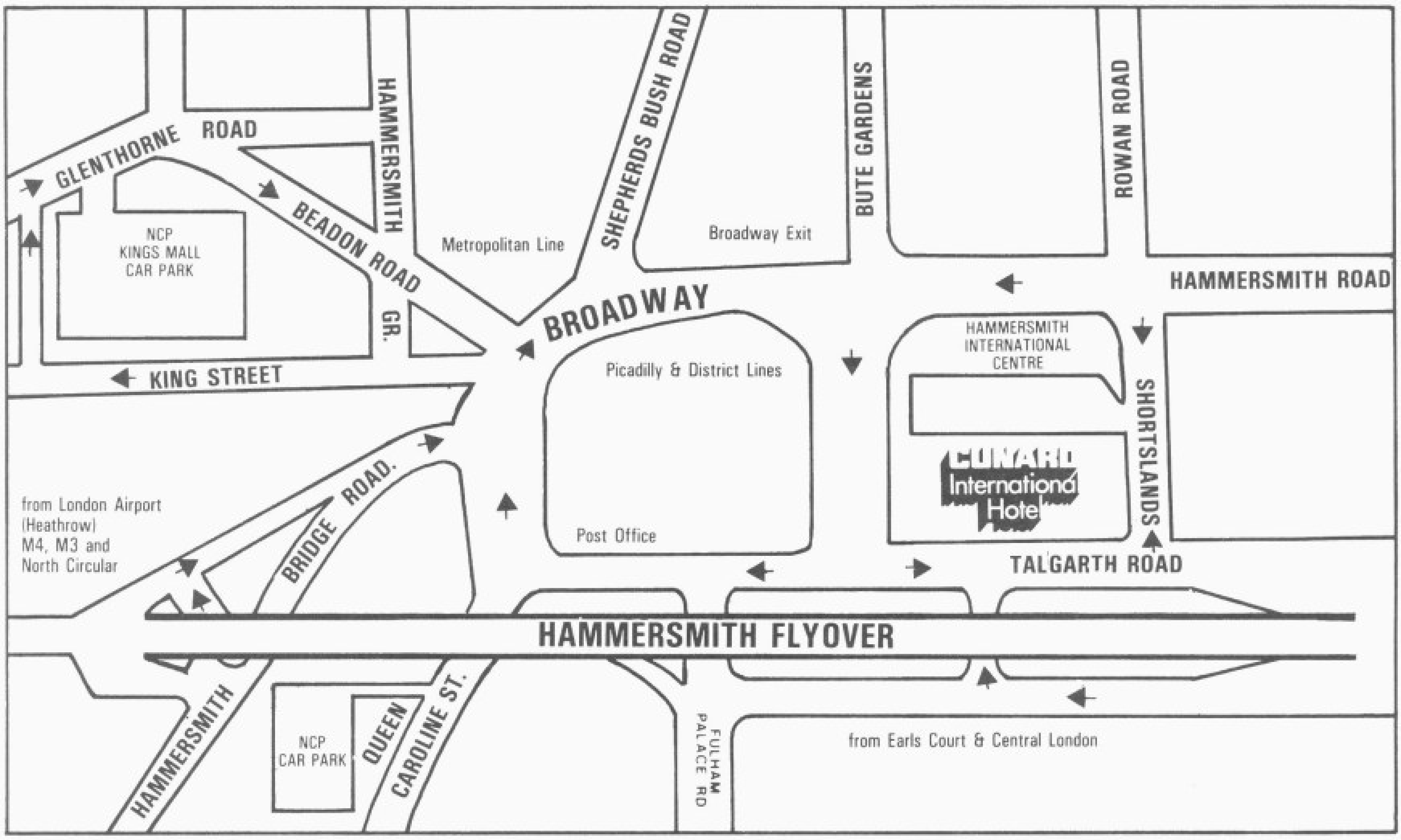
Bit frivolous, this, but if you fancy spending some of your pent-up energy by combining computers with physical enthusiasm you could try the *squash club* next to the hotel (pretty reasonable rates, but it gets heavily booked) or the very smart *swimming pool* a short jog away at the optimistically named Lillie Road Fitness Centre. And for addicts there's a 24-hour *snooker* club opposite the Church on Hammersmith Broadway; more pleasant for hot early-summer afternoons might be the public *tennis* courts nearby in Brook Green.

And if you are inclined to mix your pleasures, there's always the *Hammersmith Odeon* — extra-large touring venue for over-hyped rock bands — or the *Hammersmith Palais* ("The World's Most Famous Ballroom" alongside "The World's Most Famous Nightspot."). The *ABC* cinema in King Street (three screens) gets first-run films. And two of the best little theatres in London are local — the *Riverside Studios* in Crisp Street, just off Queen Caroline Street, and the *Lyric* in King Street: nor is the *Bush Theatre* on Shepherd's Bush Green too far away . . .

Shopping

King Street has most necessaries, including a newish pedestrian-precinct 'shopping mall' and a very good Marks & Spencers. A big Boots, too, which may be needed if your Show-going demands extra paracetemol and foot refresher spray.

If the Show has fired your desire and you want to take a look at real computers that are really for sale, you can



find Vics at *Boot's* (King Street), *Dixon's, W H Smith,* and the *Co-Op* (those three are all in King's Mall, the shopping precinct). Dixon's for one will have 64s too.

Sustenance

There's a bar and a coffee/snack bar upstairs at the Show, and the Hotel itself has a couple more bars. You might however prefer to find your victuals outside the place, in which case allow us to suggest...

Hammersmith Grove Market: small but ok for fresh fruit, and there's a couple of sandwich places there. For good value in the sandwich line try the foyer of the tube station.

Clarendon Hotel: not a hotel, just a pub on the Broadway near the tube. Good for lunch (ok shepherd's pie at £1.50). But go into the wrong bar and your drinking companions will be time-warped punks and other strays.

Swan: good pub on Hammersmith Broadway, across the road from the main tube entrance. Snacks, naturally.

Martin's: wine bar on Hammersmith Road near the hotel. "Office chic" said our legman researching the area.

PJ Wine Bar: vaguely Tudor decor, uninspiring atmosphere, but handily placed in King Street.

Lyric Theatre: our personal preference — wine bar (kids ok) and pleasant food on one of the upper floors of the theatre building on King Street, with terrace open on fine days. Nice place, through replete with exhibitions and exhibitionists. Spot the star!

Riverside Studios: food and drink in the other local theatre (Crisp Road) — even trendier, but eats are even better value.

The Chancellors: another short walk to this pub on Crisp Road off Queen Caroline Street — witty motto over door reads 'Cogitabum ergo eram'. A real West London backstreet local much frequented by non-locals from the nearby Riverside Studios.

Queens Head: pub next to the tennis courts and grass on Brook Green, worth the five minutes' walk. Beer garden, good reasonably-priced restaurant.

Laurie Arms: bearable pub sandwiched between the two arms of the Palais on Shepherd's Bush Road, distinguished by cheap food (eg shepherd's pie 80p).

The Builders: Young's beers in a lively local off King Street.

Solution Inn: extraordinary Fuller's pub on King Street — tiled facade, funereal flowers, 1950s decor, Irish predominant ...atmosphere a-plenty.

Short and pleasant post-show pub crawl (attested): start at *The Chancellors* in Crisp Street, then make for the Thames (very close) and walk upstream via *The Blue Anchor* and *The Rutland* — mayhap you'll stop to ponder the unlimpid waters below, in which case you might as well take some refreshment. Follow the river round to *The Dove,* an intimate and well-preserved pub with excellent food and a river terrace (it's an 18th century building once owned by the Duke of Sussex, who called it his "smoking box"). Next door is William Morris's old place and the 'Sons of the Thames' boathouse — it's all very English around here. A bit further on you'll find **The Old Ship Inn,** with beer terrace and boating paraphenalia.



THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW



Alphatronic Microprocessor Applications Ltd
Stand B31/C32

Alphatronic will be launching new high-resolution Light Pens for the Vic-20 and Commodore 64. These technically advanced instruments add to an existing range of high quality light pens for the 3000, 4000, and 8000 Commodore Pets.

Alphatronic will be demonstrating the use of the 18 series pen in the application psychometric tests

Also on show will be a new range of tailored dust covers for the Commodore 64 and Vic computers and their complete range of accessories.

Alpahtronic Microprocessor Applications Limited, Silbury Business Centre, 356 Silbury Boulevard, Central Milton Keynes MK9 2LR. Telephone: 0908 663906 ***Contact: Mr. C.R. James***

Anagram Systems
Stand B40/C41/B42

Business Software for Commodore Computers — all Commodore-Approved.

- **For the 8000 Series:** Integrated Accounting System; Integrated Accounting System with Product File; Integrated Accounting System with Stock Control; Sales Ledger with stock control; Sales ledger with invoicing & Nominal Accounts; Sales Ledger with Invoicing: Purchase Ledger with Nominal Accounts; Stock Controller.
- **For the 700 series:** Integrated Accounting System with Product File: Integrated Acounting System with Stock Control; Stock controller.
- **For the 64:** Sales Ledger; Purchase Ledger; EASY-STOCK.

All 8000 and 700 Series packages are available on hard disk. The Integrated Accounting System with Product File, Integrated Accounting System with Stock Control and Stock Controller are also available as multi-user systems.

Anagram Systems, 60A Queen Street, Horsham, West Sussex RH13 5AD Telephone: 0403 50845/58153 ***Contact: Richard Hall.***

Anirog Software
Stand B124

The name Anirog is well known in the computer entertainment business, particularly for it's Vic range. **KRAZY KONG** and **XENO II,** both for the 16K expanded Vic, have received universal acclaim from all quarters. Programs such as these have established our reputation as the value-for-money software house. We have followed these two huge successes with another two big games for the 16K expanded Vic owners, **GALACTIC ABDUCTORS** which uses the *full* TV screen with stunning effects: and **3D TIME TREK** which has superb 3D graphics with arcade action.

There is a new game **PAINTER** for the unexpanded Vic. Following our graphical adventures **PHARAOH'S TOMB** and **ZOK's KINGDOM** we have brought out the first in a series of text and graphical adventures in the vein of *Dungeons and Dragons.*

Not forgetting the CBM64: we can now offer **3D TIME TREK** and **FROG RUN.** Both games offer extra features over and above the Vic versions.

ASK Ltd
Stand B125

A.S.K. is a leading producer of educational games for the Vic-20 and Commodore 64, enabling children to use their computer for something more than space wars.

Founded by Tom Stonier, Professor of Science and Society of Bradford University and author of the recently published and much discussed book on the computer revolution *The Wealth of Information,* A.S.K. is a unique team of working teachers and professional programmers.

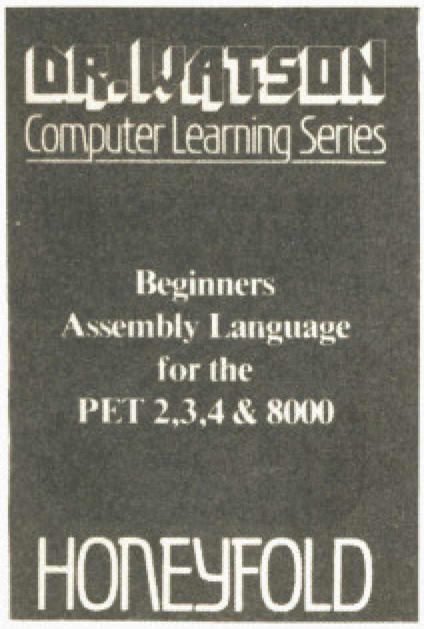
So far A.S.K. has produced ten programs for 3-12 year olds. They supplement what children eventually learn, or are learning, at primary school ▶

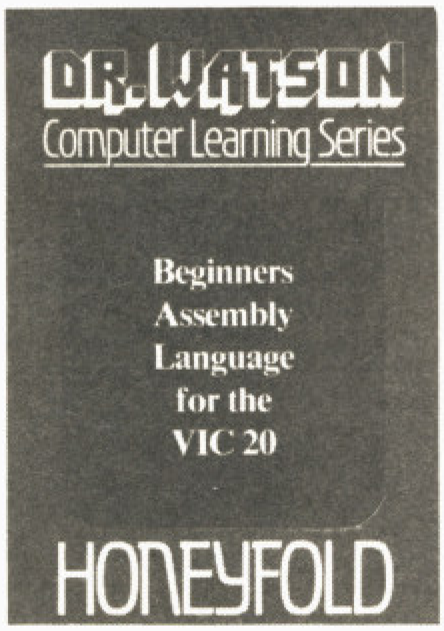
COMPLETE

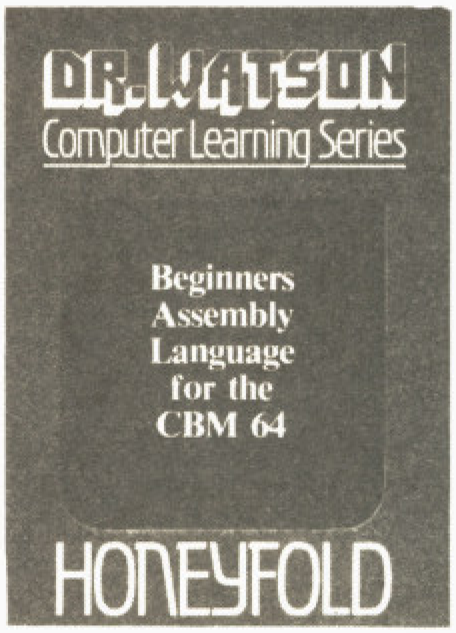
BEGINNERS 6502/6510 COURSE

IN

ASSEMBLY LANGUAGE PROGRAMMING







Each tape contains a complete 6502/6510 Assembler plus a BIN/BCD/Hexadecimal tutor.

This self paced course takes you from the absolute beginner in Assembly language, through the whole 6502/6510 instruction set and, as the press reviews have said, these are the FIRST books really written for the beginner.

From the earliest chapters your programs will run as the book is written to suit the purpose-designed assembler. Just to nurse you through these early stages the tape contains a complete binary, binary-coded decimal and hexadecimal tutor.

The chapters will tell you about:

- How to get started.
- Conditional and unconditional jumps.
- Setting the flags.
- Screen displays.
- Timing things.
- Mathematical operations.
- Labels, memory labels and macros.
- Saving loading and printing machine-code programs.
- Interrupts, overflow and break flags.
- The USR command.
- Floating point numbers.
- The 6502/6510 instruction set.
- and lots more.

Just to check that you are on the right road, each chapter has numerous exercises, all of which are explained in full – at the back.

Each book is a bargain with a complete 6502/6510 reference text, a full assembler and a book that the beginner will understand.

Available from all good computer and bookshops or direct from Honeyfold.

BOOK AND TAPE COURSE FOR BEGINNERS

14·95
inc p&p

"The existing books are far surpassed by Dr Watson" D. Bolton, Vic Computing.

"There aren't easier ways of learning how your computer does it" K. Dallas, P.C.N.

HONEYFOLD

Honeyfold Software Limited
Standfast House, Bath Place,
High Street, Barnet, London.
Tel: 01-441-4130

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

in the basic skills of language, mathematics and problem solving.

Programs such as **Facemaker** and **Words, Words, Words** improve reading, spelling and observational skills through games which are fun to play and substantially challenging to enagage a child's attention.

Very young children will be intrigued by **Shape Up** and **We Want to Count** and the easier levels of **Hide and Seek,** which is quite a challenge for *all* at the higher levels.

Number Puzzzler, Chaser and **Gulper** are great games for everybody wishing to improve their mathematical skills — they even give adults a hard time.

All the programs make good use of graphics, sound and colour and are designed to give encouragement and reward to players. They require 8K or 16K RAM pack capacity. They retail at £8.95 including VAT or £9.50 including p&p direct from A.S.K.

A.S.K. Ltd, London House, 68 Upper Richmond Road, London SW15 2RP. Telephone: 01-874 6046. ***Contact: Peter Lever.***

Audiogenic Ltd
Stand: B101/102

Audiogenic, the leading independent supplier of software for the Vic-20, has extended its operation to encompass the Commodore 64. A wide range of software for both machines will be on display including:

• **Commodore 64** — *Wordcraft 64:* the 64 version of the phenomenally successful Wordcraft word processing system. Wordcraft 64 is the ultimate word processor for the 64! Written 100 per cent in machine code, Worcraft 64 incorporates all the well known features of Wordcraft and takes advantage of the larger screen format of the 64 to give greater readability.

Motor Mania: a thrilling cross-country car race game on cassette, in which the player has to avoid hazards. Motor Mania is a powerful demonstration of the Sprite graphics capabilities of the 64.

Renaissance: the 64 cassette version of the best selling Vic cartridge game, Renaissance is the state-of-the-art Othello board game.

Grandmaster: the strongest chess game for home microcomputers, Grandmaster has a wide range of facilities.

Forth: written by Dave Middleton, Forth is a powerful and flexible structured language, ideal for those frustrated with the limitation of Basic who are not yet ready for assembly language.

Monitor: Audiogenic's 64 Monitor takes the misery out of machine code. Completely transparent to other programs, Monitor contains standard TIM commands plus a wide range of features including a Centronics interface, allowing the 64 to communicate with many of the high quality printers.

• **Vic-20** — Included in the Vic software on display will be:

Apple Panic: successfully carries over the many graphics and features that contributed to the game's popularity in the arcade.

Choplifter: the officially licensed Vic version of the best-selling Atari game by Broderbund Software, Choplifter has already taken the States by storm and is set to become a second 'Space Invaders'. The game revolves around a helicopter which has to rescue fighting units from a battlefield. A total of four groups (64 commandos) must be saved. The game sounds easy: it gets more dangerous with each flight.

Home Applications: a range of six home application programs designed to bring the Vic-20 into the home as more than a games machine. Packages include: Car Costs, Loan Analyser, Home Inventory, Decision Maker, Household Finance and Home Office.

Audiogenic Ltd, PO Box 88, Reading, Berkshire. Telephone: 0734 595647. ***Contact: Martin Maynard.***

Automation Facilities Limited
Stand B5

Commodore Business Machines, like all well seasoned travellers, could fall prey to foreign hazards; so it's just as well that a special cleaning kit, the AF Pet kit, is supplied at the start of their journey — to keep them working perfectly however hot, statically charged or dusty their new environment turns out to be.

The AF Pet kit contains **SAFECLENE,** a tape drive cleaning fluid, **SAFEWIPES,** lint free cotton squares, **FOAMCLEAN,** aerosol cleaner, **SAFEBUDS,** cotton bud sticks for keyboards, printers etc., **SAFECLOTHS** cleaning cloths and **SAFECLENS,** VDU screen wipes.

Also contained in the AF Pet kit is **FLOPPICLENE,** a disposalbe flexible diskette head cleaner. **FOPPICLENE** features an open ended jacket which enables a fresh cleaning disk to be used for every cleaning operation. The risk of head recontamination and abrasion is completely eliminated. Faultless data capture and transmission is assured.

The Pet kit is one of a comprehensive range of AF computer cleaning products.

Automation Facilities Ltd, Blakes Road, Wargrave, Berks. RG10 8AW. Telephone: 073522 3012. ***Contact: Huberta Kingsbury.***

Beaumont Summer Camps Ltd
Stand A127

Beaumont Summer Camps are pleased to be participating at this year's Show. Camp Beaumont are Britain's largest and most experienced children's day camp operators: this summer, Camp Beaumont will have up to 40 brand new Commodore microcomputers (Vic-20s and 64s) at each of their ten centres located throughout the country.

Children who choose the Computer Camp will get two hours per day of actual 'hands-on' tuition in Basic programming, robotics and elementary micro electronics. In the afternoon, everyone is free to join the other campers in some 30 different sporting and creative activities including swimming, sailing, shooting, windsurfing, gymnastics, horse riding and judo.

The first residential camps in Sussex, Devon and the Lake District open on 16 July. Day Camps, which are run from famous public schools like Brentwood, Mill Hill and Charterhouse, open on 18 July.

Details about all of Camp Beaumont's activity holidays for children aged 4 to 16 will be available on the Stand, and parents are free to meet and talk with experienced campers, counsellors and instructors.

Beaumont Summer Camps Ltd, 73 Upper Richmond Road, London, SW15 2SZ. Telephone: 01-870 9866. ***Contact: Stewart Wiley.***

If you're looking for . . . Games Try These exhibitors:

- **Audiogenic**
- **Anirog**
- **A.S.K.**
- **Bubble Bus**
- **CBM Software**
- **Datatronic**
- **Interceptor Micros**
- **Llamasoft**
- **Rabbit Software**
- **Supersoft**
- **Vic Soft**

Binar Ltd
Stand B7/B8

Binar Ltd, H'Be'lyar 44, Kikar Hamedina, Telephone: Tel Aviv, Israel. ***Contact: Ephraim Feigenbaum.***

Bubble Bus
Stand B118

Bubble Bus is the newly-formed division of The Computer Room, a company which has been creating approved software for Commodore business applications.

Bubble Bus is devoted to creating and marketing a wide range of top quality products for the Vic-20 and CBM 64, including games, educational and business programs; Bubble Bus programs are already sold by many dealers in the UK and in countries overseas. Fifteen new products for the Vic-20 and eight for the CBM 64 will be on show — including the top selling 'Exterminator' on the Vic and 'Pool' on the 64. Software may be purchased on the stand where you can also enter our special show competition.

Bubble Bus, 87 High Street, Tonbridge, Kent. Telephone: 0732 355962. Telex: 95151. ***Contact: Jo Fisk.***

Show Directory

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

CDS Ltd
Stand B121

CDS has spent a large amount of time and effort in designing and manufacturing micro computer furniture. The result is the Executive Desk, ideal for the go-ahead executive who wants to maintain his image and his micro; there is also the Micro Tidy which houses the Vic and CBM 64, hiding all the wires and at the same time acting as an attractive item of household furniture. Both are made to a very high standard at a competitive price.

CDS Ltd, Abacus House, Barbourne, Worcester. Telephone 0905 612261. ***Contact: Tony McDowell.***

Claremont Controls Ltd
Stand: B61

The effective management of products is essential. Many projects are clearly recognized: building a bridge, launching a satellite. Many other projects are less easily recognized: installing production line, marketing a product, developing a new technique. Common to all projects is the need for effective management, ensuring that the resources of an organisation are productively employed and smoothly coordinated.

Hornet is an aid to effective project management. It cominbes the very latest microcomputer technology with long-established management techniques to provide a tool which is at once both powerful and convenient. It ensures that realistic targets are set, expenditure is kept within budget and resource are efficiently used.

Hornet is a complete system which enhanced the effective management of any project.

Claremont Controls Ltd, Albert House, Rothbury, Morpeth, Northumberland. Telephone: 0669 21081. ***Contact: Roy Stephenson.***

Compsoft Ltd
Stand A11

Compsoft is showing the popular DMS (Data Managment System): DMS is the powerful records management system which won the 1982 RITA Award for *Software Product of the Year.* This database can be used for any record keeping job such as client/customer records, invoicing, personnel, library, stock, medical or property records.

Although the user sets up unique files to suit the exact requirements of his/her company or organisation, DMS works entirely in English and requires absolutely no programming.

All versions, except those for the 3000 or 4000 series, have their own letter-writer and label-printer as standard. This makes DMS a perfect system to use for selective mailing. The standard DMS on the 8000 series cost £290.00 and the DMS Diamond £395.00.

All Compsoft's products are supported by a Users Club giving hotline support, a quarterly newsletter and an update scheme, plus training courses at the Compsoft Training Centre near Guildford. Application Guides showing DMS dealing with a variety of different tasks are availble free on the stand.

Compsoft Limited, Hallams Court, Shamley Green, Near Guildford, Surrey GU4 8QZ. Telephone: 0483 898545. ***Contact: Jackie Chalcraft.***

If you're looking for...
File management packages
Try these exhibitors:

Compsoft
Dataview
Missing Link
Precision Software
Rabbit Software
Stage One Computers
Superclerk
Tamsys



Computastore Limited
Stand B1/2

Computastore will be showing a brand new version of Superpay for the 8000 Series Pets with even more facilities and great ease of use than before — and still only £395.

Over the past 4 years, Computastore's Superpay and Basic Pay Payroll packages have proved their effectiveness in over 1700 companies — ranging in size from 6 employees to over a thousand, and now the new version of Superpay is even more flexible.

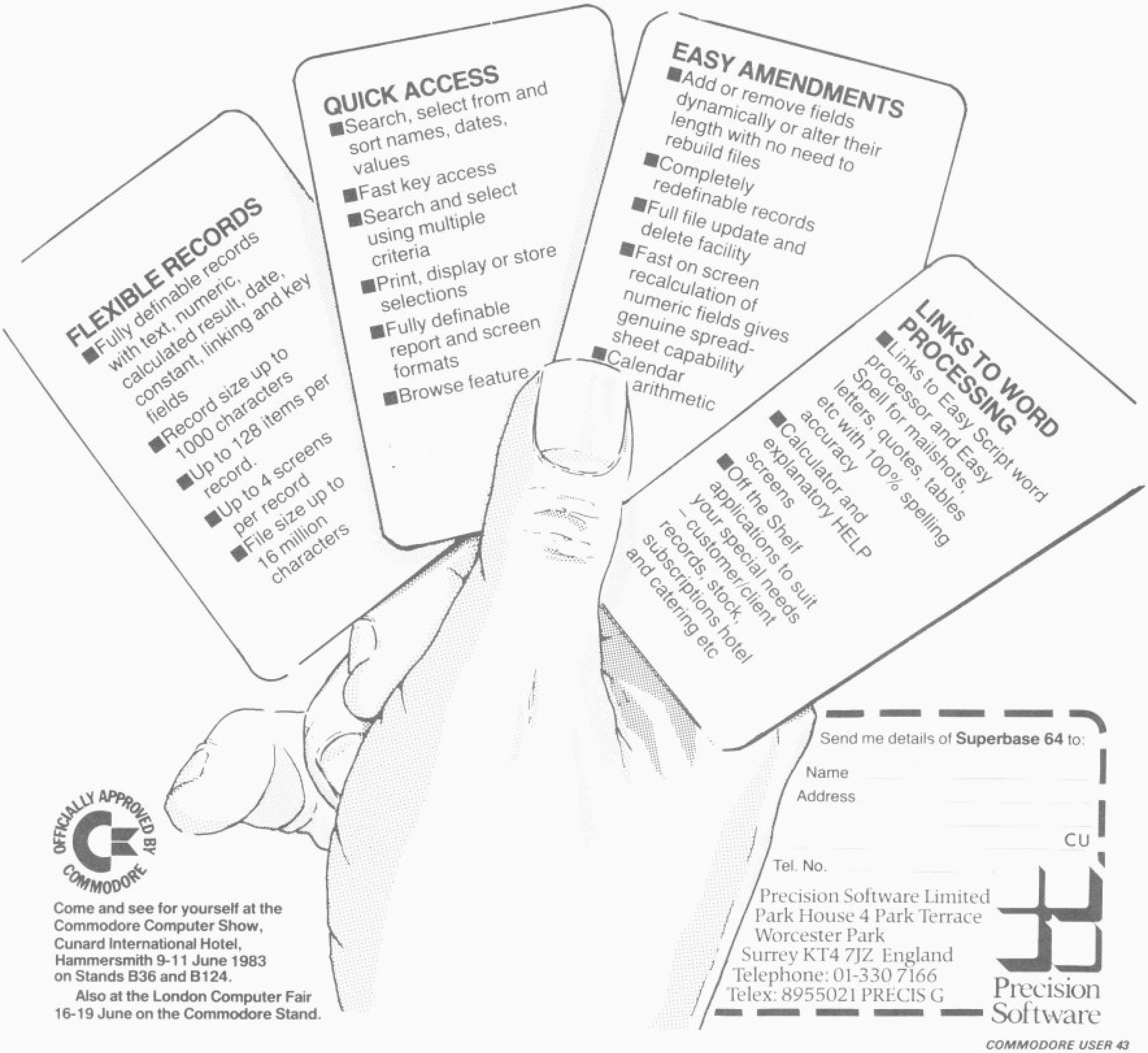
Additional features include: Statutory Sick Pay calculations, 11 Gross Pay elements — ideal for manufacturing companies with complicated payment methods. Multiple companies on a single disk — ideal for Bureaux with lots of clients. Greater disk capacity — up to 900 employees on a single disk. New screen layouts — to make day to day operation even easier. Reset employee totals to last week — to re-run an incorrect payslip.

Runs on 8000 and 700 Series Commodore Business Computers.

Computastore Limited, 16 John Dalton Street, Manchester M2 6HG. Telephone: 061-832 4761. ***Contact: David Nicholson.***

Strengthen your hand with Superbase 64

The complete information control system for the Commodore 64. Ideal for any home, business or professional environment where records are kept. Create the format you need and enter your records. If the layout or data field sizes are not quite right, correct them and carry on. Superbase gives you an unrivalled range of powerful features including:



OFFICIALLY APPROVED BY COMMODORE

Come and see for yourself at the Commodore Computer Show, Cunard International Hotel, Hammersmith 9-11 June 1983 on Stands B36 and B124.

Also at the London Computer Fair 16-19 June on the Commodore Stand.

Send me details of **Superbase 64** to:

Name

Address

CU

Tel. No.

Precision Software Limited
Park House 4 Park Terrace
Worcester Park
Surrey KT4 7JZ England
Telephone: 01-330 7166
Telex: 8955021 PRECIS G

Precision Software



THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

Commodore Computing

Stand A20/B120

Commodore Computing International Magazine, now available nationally, is dedicated solely to users of Commodore machines. This is the magazine that is always first with information-packed articles. Whatever it is you require — news, hardware/software reviews, programs for all types of industrial, business and home use — look in Commodore Computing International Magazine first. Visit us on stands A20 and B120, buy a copy, take out a subscription and be amazed at the range of literature available — Pet Graphics, Vic Revealed, Vic Graphics, Vic Games. Should you have any queries or programming problems then the staff of Commodore Computing International will be more than willing to help you.

Commodore Computing International, 167/169 Great Portland Sreet, London W1N 5FD. Telephone: 01-636 6354. ***Contact: P. Chandler.***

Commodore (Concessionaires) Ireland Limited

Stand B3

In Ireland one of the fastest growing sectors of the economy is the electronics area. The Industrial Development Authority has made it clear that it puts much of its hopes for industrial development in this area.

Already the successes have started with more and more of the highly advanced electronics industries setting up and others looking towards Ireland which has one of the youngest and most adaptable and best educated populations in Europe.

One of the major areas of growth has been in computers and software, and the Irish market has been growing by leaps and bounds as a new industrial base in built up.

At Stand B3 you are welcome to come along and hear the facts and figures on the Irish market from Commodore (Concessionaires) Ireland Limited: drop in and see us.

Commodore (Concessionaires) Ireland Ltd, Barton House, Francis Street, Galway, Ireland. Telephone: 010-353 916 7156. ***Contact: Rod McGowan.***

The Computer Room

Stand B39

The Computer Room is presenting two new Commodore-approved products.

• **Epic (Engineers Production and Information Control):** EPIC is a manufacturing system designed for the small-sized manufacturing company in the job or batch production environment. It is available in modular form and its features include the following:
Method File: manufacturing process information for each product.
Job Cards: factory paperwork and progress information.
Shop Loading: scheduling of customer demands to man or machine resource.
Factory Performance: measurement of both operator and machine performance.
Stock Control: all levels of manufacturing including raw materials are catered for.
Customer Schedules: up to date status of customers orders.
Management Information: production programs, order analysis and other key reports.
Database: file system for tooling or drawing records.

• **Moons Strip Supernews:** Based on the Commodore 64, Supernews is the most flexible and the most cost-effective system on the market for newsagents. The complete system costs from around £1,500 and provides complete control of newspaper delivery and accounting, rounds lists, substitutions, holiday stops and starts, special stops on *TV Times* and *Radio Times,* statements, morning and evening rounds, price changes handled in office, physically very small, debtors listings, 600 accounts per diskette and nationwide maintenance cover.

Supernews is the first approved product on the CBM 64 and is available nationally through selected Commodore dealers.

The Computer Room, 87 High Street, Tonbridge, Kent. Telephone: 0732 355962. ***Contact: Jo Fisk.***

If you're looking for . . .
Business accounting
Try these exhibitors:

Anagram Systems
CBM Software
Compsoft
Computastore
CSM
Dataview
FACTS Software
Intex Datalog
L&J Computers
Landsoft
LDCS
Micro-Simplex
Pegasus Software
Superclerk

. . . you'll find ledger accounting, invoicing, stock control and payroll at most of these stands. Check out the File Management suppliers too.

Computer Services Midlands Ltd

Stand B54/55

• IF YOU'RE A PROFESSIONAL ACCOUNTANT — come and see the UK's best selling Accounts Production package and why MICROMAN software is installed in over 900 practices throughout the UK.

• OR IF YOU'RE A NEW COMMODORE DEALER — come and see the quality of software and support which has captured the largest share of the UK's most influential market — especially when it comes to the specification of computer systems for small businesses and why Accountants are now recommending BUSINESSMAN as the in-house system for their clients.

• OR IF YOU'RE AN ESTABLISHED COMMODORE DEALER — come and see the latest additions to the powerful sales features of the MICROMAN family of software including the new BUSINESSMAN Integrated Stock Module; the link between AUDITMAN & BUSINESSMAN; the links between AUDITMAN, BUSINESSMAN and Visicalc; and most importantly the AUDITMAN Report Editor which for the first time allows on-screen editing of final accounts.

Computer Services Midlands Ltd, Refuge Assurance House, Sutton New Road, Edington, Birmingham B23 6QX. Telephone: 021-382 4171. ***Contact: George Buchan.***

Commodore Dealer Co-operative
Stand A24

The stand is being manned by members of the newly-formed dealers' co-operative.

South East Computers, Unit 2, Castleham Road, Castleham Industrial Estate, Hastings, Sussex. Telephone: 0424 426844. ***Contact: Howard Bates.***

Reeves Computing Ltd, 24 Spilman Street, Camarthan, Dyfed. Telephone: 0267 32441. ***Conctact: Lawrence Reeves.***

Commodore — Education Department
Stand D4

Commodore has a special exhibit which underlines their commitment to the educational opportunities in computing. Prime attention is focused on the Commodore Educational 64 machine — a Pet housing with a colour monitor, Commodore 64 technical specifications, incorporating the LOGO language. Expert educational software producers are featured including:

- Data Limited of Cheltenham — with 'Talking Books'.
- Studio Software — with their 'designer' and 'micrometer' programs.
- Birmingham University — with their special pre-school software.
- The Camsoft German Tutor.

There will also be a major Commodore Networking System on the stands showing the local area network that Commodore have devised, incorporating Prestel and Pet-Net.

Commodore Educational Department, Ajax Avenue, Slough, Berks. Telephone: Slough 74111. ***Contact: Nick Green.***

Commodore New Products
Stand D2

Certainly the highlight of this year's Show will be the many new computer hardware products on display for the first time in Britain.

The Commodore New Products stand will feature the Commodore 64 portable computer and the Commodore 700 series business computer with CP/M and MS-DOS. Each system will be available for hands-on experience for any visitor attending the Show. Also on display will be the new Commodore 1520 printer-plotter which interfaces to the Vic-20 or Commodore 64.

Of particular interest to businessman should be the new systems printer — the 6400 — which will make its debut at this year's Show. The 6400 is a powerful, fast daisywheel printer that complements the 8000 series and is currently available with the friction feed option.

Other new products on the Commodore stand include the 1701 colour monitor for the Vic-20 or Commodore 64 and the new 8250 disk drive in a low profile housing.

Commodore will have a host of trained representatives on hand to answer questions and demonstrate how Commodore's latest products are of proven benefit in both business and the home.

Commodore Business Machines, 675 Ajax Avenue, Trading Estate, Slough, Berks SL1 4BG. Telephone: Slough 74111. ***Contact: Aileen Bindley.***

Commodore Sales Training
Stand B10

Did you know that Commodore offers a range of sales and management training courses exclusively for Dealers and Approved Products suppliers — and all at no charge? You will be able to see the complete schedule of the courses available and find out more about them on our stand.

Commodore Business Machines, 675 Ajax Avenue, Trading Estate, Slough, Berks SL1 4BG. Telephone: Slough 74111. ***Contact: Brian O'Hara.***

Commodore Software
Stand D3

On Stand D3 Commodore will be showing the latest range of software for the Vic-20 and Commodore 64 that is currently available in the UK.

The stand will have six equipment desks divided into three demonstration areas. On one side will be new business software such as *Future*

Finance, Easy Script/Easy Spell and *Easy Stock*. In the centre area will be two desks: one will have a Commodore 700 series business computer with software, the other is devoted to thinking and decision games such as *High Flyer* (a remarkable disk-based game about airport management with true-to-life graphics) and a new adventure game called *Medusa's Lair*. Opposite the business software will be a rolling demonstration of *Simon's Basic, PetSpeed, Assembler* and many other useful utility programs that help to maximise the effectiveness of Commodore micros.

At every station, Commodore technical experts will be on hand to answer questions and demonstrate the features of each Commodore software product.

Commodore Business Machines, 675 Ajax Avenue, Trading Estate, Slough, Berks. SL1 4BG. Telephone: Slough 74111. ***Contact: Marilyn Rutley.***

DAMS Business Computers Ltd
Stand B113

DAMS Business Computers will have on display its highly successful IEEE cartridge, which plugs into the back of a Vic-20 or CBM 64 and will connect all peripherals previously associated with Commodore Pets. No software change is necessary and the cartridge comes with a full 12-month guarantee.

This cartridge is being widely exported and has had an enthusiastic reception from users abroad and in the UK.

Also for the Vic-20 and the CBM 64, DAMS' RAM 'n' ROM board is an exciting add-on at only £22.95 plus VAT. On its own it has 3K of RAM; add to this two empty ROM sockets for further expansion — or simply plug in either a DAMS VICMON chip (the ultimate machine code monitor with 24 direct machine-code commands at your disposal) and/or the VICAID 'toolkit' chip, which will enable you to debug that crashed program (plus eight other toolkit commands and a further eight TIM machine-code monitor commands.

DAMS' anti-glare screens are available for all Commodore machines and are an effective way to reduce eyestrain at a low cost of £19.95 plus VAT.

DAMS Business Computers Ltd, Gores Road, Kirby Industrial Estate, Liverpool L33 7UA. Telephone: 051-548 7111. ***Contact: Ian Hetherington.***

Datatronic AB
Stand A13

This year on the Datatronic stand we will be showing:

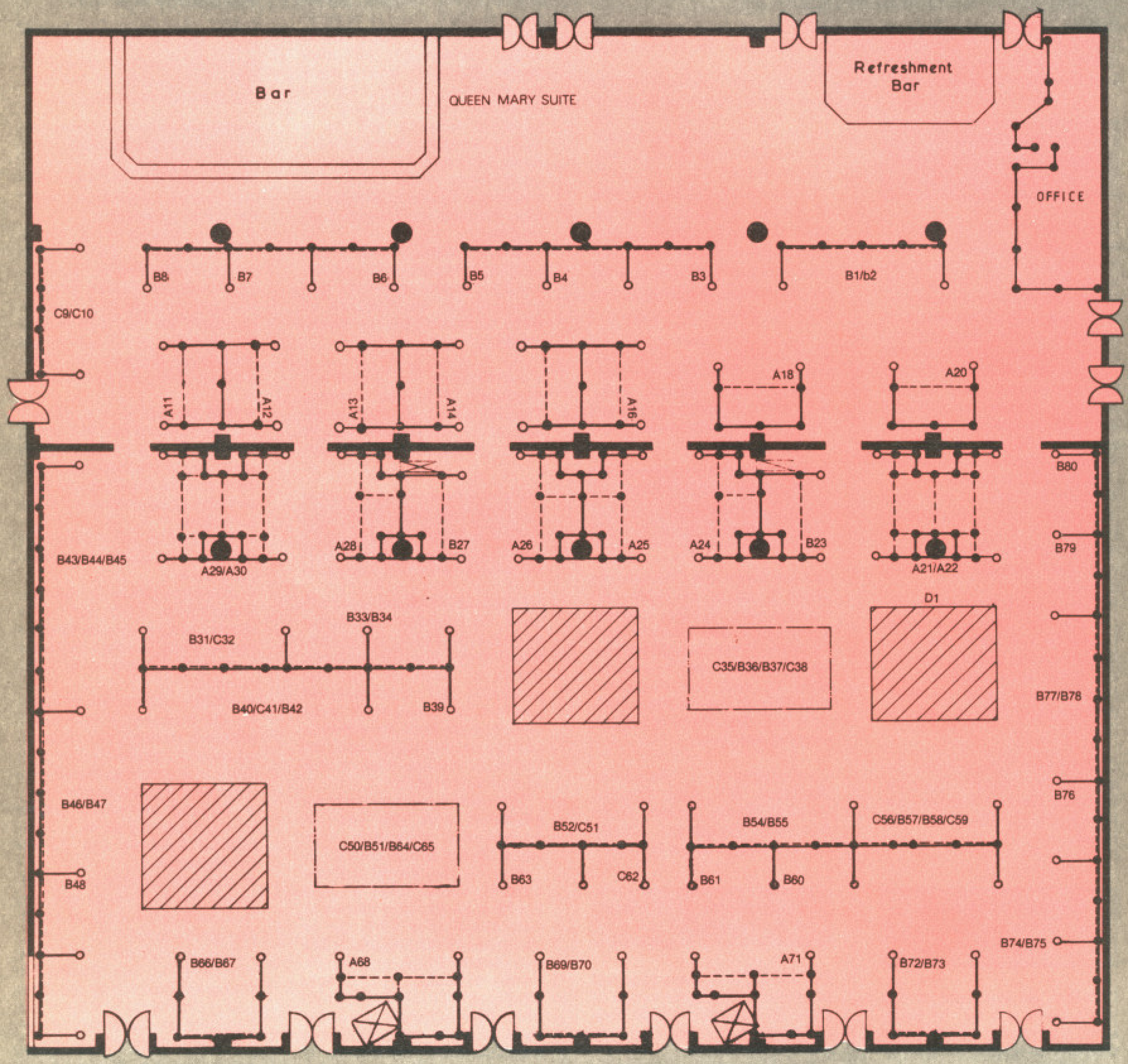
- **Calc Result** — a three-dimensional calculation program with built-in graphics, help functions, flexible printout facilities, colours (64), communication (700). The most powerful, flexible and easy-to-use calculation program for Commodore 8000 and Commodore 64.
- **Vic Switch** — a multi-user unit for Vics and 64s. Vic switch enables you to connect up to eight Vics or 64s tothe same disk drive and the same printer. Vics and 64s can be connected at the same time.
- **Pet Switch** — a multi-user system for the Commodore 8000 computers.
- **Backup-system** — for the Commodore hard disk. The Handic backup system enables you to make backup from the hard disk directly to a video recorder.
- **Diary** — a database program for the manager. You can, for example, store phone numbers, addresses, appointments etc. Diary is a cartridge-based program for the Commodore 64.
- Exciting **adventure games** for the Commodore 64 — **Ship, Mutant Spiders, the Fourth Sarcophaqus.**
- Several cartridge-based programs for the Vic-20 and the Commodore 64 such as *Forth, Stat* and *Graph.*

Handic Softwre AB is a company in the Datatronic Group and its software products are available wherever Commodore Computers are — throughout the world.

Datatronic AB, Vreten Borgs Vaegen 8, Box 42094, Stockholm, Sweden. Telephone: 010 46 8744 5920. ***Contact: Per Skedung.***

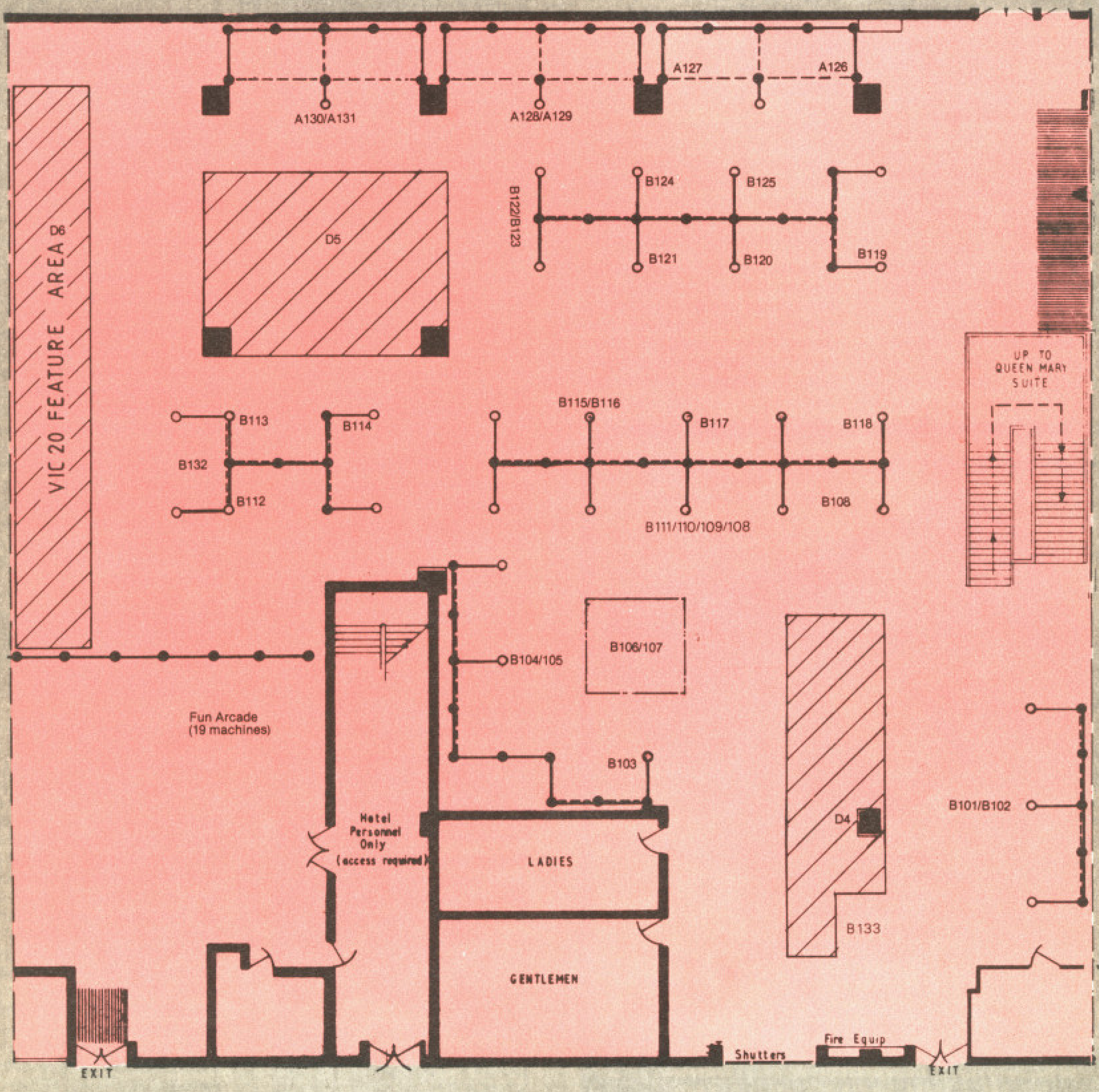
THE 4TH INTERNATIONAL COM

Cunard International Hotel, Hamme



COMMODORE COMPUTER SHOW

Hammersmith, London. 9-11 June 1983.



Dataview Group
Stand: D1

Based in East Anglia, the Dataview group consists of four companies all involved in the marketing of modern office technology products and services.

• **Dataview Limited:** One of the leading publishers of microcomputer software, earning significant export revenues for the United Kingdom. Specialising in the area of professional business software, Dataview products have been brought by well over 30,000 business system users in Britain alone. Dataview just won an ICP Five Million Dollar Award for Wordcraft sales.

The company also sells business microcomputer systems throughout East Anglia and with a customer base of 1,000 installations is known for its commitment to the microcomputer user. Full engineering and programming services are provided by Dataview's own staff.

• **Dataview Systems Limited:** Specialises in supplying larger applications requiring a 'systems' approach. Consultancy services can be provided and the company has much experience in planning, design and the implementation of large integrated computing systems.

Dataview Systems also specialises in the writing of computer programs for customers who cannot resolve their business needs using 'standard' packages. This 'bespoke' approach has been successfully applied to a number of business areas and DSL systems have written programs for many computers including IBM System 23, Altos, Honeywell, DEC and Data General equipment.

• **Dataview Inc:** Based in Philadelphia, spearheading the export drive to market Dataview's products in the United States.

• **Dataview Supplyline Ltd:** The range of products includes electronic typewriters, word processing systems, facsimile transceivers and OCR readers.

To provide you with a first-class service, it is our policy to sell through an extensive dealer network. Our dealers are strategically located all over the UK so that you can contact them by personal visit or by phone: in fact we have over 300 approved dealers in this country, all of whom can provide you with information about Dataview's software packages.

• **Wordcraft:** Turns a microcomputer into a very accomplished word processing system.

• **The Executive:** Combines the power of Wordcraft with information retrieval.

• **The Financial Director:** A powerful program that provides the businessman with the ability to conduct financial analysis and strategic planning.

• **DATA-LEX:** An accounting and time recording system for solicitors to handle client and office accounts to guidelines laid down by the Law Society.

• **Electronic Cash Book:** Allows one of the most irksome tasks of a business, maintaining and reconcilling the cash book, to be carried out easily and conveniently on a microcomputer.

• **STOCK-AID:** A full stock control and stock management information system to maximise the profitability of a business.

• **DTL BASIC COMPILER:** Suitable for users who enjoy writing programs using Basic. By using this program it is possible to translate or convert the program to 'pseudo' machine code.

• **DLT BASIC System 95:** For the CBM 8096 computer. Using this system it is possible to develop Basic programs almost 250 per cent larger than has previously been possible

• **HYDRA:** Local Area Network system for the CBM range of computers.

Dataview Group, Portreeves House, East Bay, Colchester CO1 2XB. Telephone: 0206-869414/865835. ***Contact: Paul Handover/Amit Roy.***

DDM Direct Data Marketing Ltd
Stand B69/B70

Not content with presenting the most comprehensive yet user-friendly software pack for the production manager operating on the 8000 Series, DDM are already optimising **Factory Manager** for the new 7000 Series. With Factory Manager, you can:

PRODUCTION (a) obtain an immediate screen display of progress on a particular customer's job. (b) print a list of progress on all jobs as they move from process to process through the factory. (c) print a report of every operative's performance each day to show whether the quality of work and the work-rate are at required levels.

STOCK (a) obtain an immediate screen display of the status of a particular stock line; current level, unit cost, supplier, quantity on order, projected delivery date. (b) print a stock valuation list either for all or for a section of stock lines. (c) print a list of all items where stock levels have fallen below a predetermined minimum.

ASSEMBLIES (a) given an instant printout of all parts necessary to produce a given number of a finished product. (b) print out a list of all components where insufficient stocks exist for a projected production run.

SYSTEM CAPACITIES

Up to 4,000 lines of stock.

Up to 200 jobs and assemblies.

Up to 40 different components in any one assembly.

Up to 9 production areas and 150 different processes.

Now with the launch of the CBM 64, DDM can offer a cost-effective, disk-based system for stock control wtih detailed Manufacturer's Reports at a total hardware and software cost of well under £1,000.

DDM Direct Data Marketing Ltd, 86/87 Wilton Road, London SW1. Also at 22 Warley Hill, Brentwood, Essex. Telephone: 01-834 5016/0277-214168. ***Contact: Louis Szikora.***

3D Digital Design and Development
Stand B77/78

Two new products launched at the Commodore Show will make welcome additions to the extensive range available from 3D Digital Design and Development — the first interface specialist to offer a complete range of IEEE-488, RS-232C, memory-mapped and remote intelligent scientific and industrial interfaces for the entire Commodore range.

3D's existing versatile IEEE-compatible Basic-addressable standard units and its multichannel modular INLAB system have already proved popular with an impressive list of Commodore users which includes ICI, Ford, British Gas, Plessey, Marconi, and British Telecom.

The range of applications is virtually limitless — industrial or

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laboratory monitoring and control, both local and remote in fields as varied as civil engineering, chemical, physical and agricultural research and automotive testing. It is little wonder that 3D, who also offer a custom design service, goes by the motto "You have the problem — we have the solution."

Visitors are invited to take a look at the two new RS-232C compatible multi-channel simultaneous-sampling data acquisition systems on show for the first time on stand B77/8.

3D Digital Design and Development, 18-19 Warren Street, London W1P 5DB. Telephone: 01-387 7388. ***Contact: Dr Alan Mills.***

Dynatech Microsoftware Ltd
Stand A29/A30

Dynatech Software will have on exhibition their very fine software package **CODEWRITER.**

"Design your own business information programs in plain language — WITHOUT PROGRAMMING." Simply type the screen layouts the way you want them, add any calculations you need — and CODEWRITER takes over. Your Commodore 64 becomes your private programmer. You get your programs for information entry, searches, updates, automatic calculations, etc. Programs to write reports, print cheques, letters, mailing labels, nearly anything — all written for you by CODEWRITER. You can even use CODEWRITER to design your own menus.

Full retail price £125.00 plus VAT.

Dynatech Microsoftware Ltd, Summerfield House, Vale, Guernsey, Channel Islands. Telephone: 0481 45934. ***Contact: John Marjoribanks.***

FACTS Software Ltd
Stand B46/47

The Microfacts range of accounting packages will be shown on the Commodore 8000 Series and the new 700 Series.

This long-established, high-quality suite of programs has long been a best-seller for Commodore. There are now some 700 installations of the package in the UK and abroad and the system has been sold by the Commodore dealer network for around three years.

Particular features of interest are the ability to maintain accounts for a number of companies, each with several Sales and Purchases Ledgers on the same pair of floppy disks. This obviously makes the system extremely easy to use.

Designed and implemented by people with many years practical experience, not only of implementing mechanised accounting systems, but also of running a typical small to medium-sized business, particular emphasis is put on the practical aspects of the system and its overall ease of use.

A unique feature of Microfacts is the ability to maintain job cost records totally integrated with the accounts data. This is particularly important for any prospective customer working in a contract environment — eg builders, plant hire contractors, office cleaning contractors.

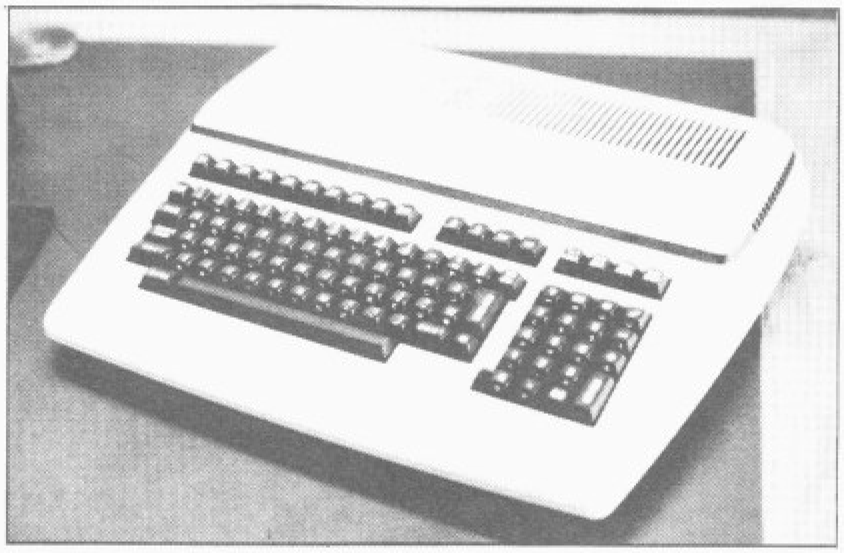
Prices range from £300 to £1,800 depending on requirements.

FACTS Software Ltd, 75-79 Tavistock Street, Bedford MK40 2RR. Telephone: 0234 218191. ***Contact: Shane Barnes.***

FCG Computer Systems
Stand B74/B75

FCG will be exhibiting their established contractors' payroll and accounting systems along with the soon-to-be-launched bill of quantities/estimating systems. The contractors payroll and accounting systems are now in use in over 150 contractors' offices throughout the UK. They take account of all the specific requirements for contractors, for example holiday with pay stamps, fares allowances and travel money, C714 subcontractors and both systems give complete contract costing. The bill of quantities/estimating systems can be used for bill production and monthly valuations by quantity surveyors and the estimating module will enable contractors to produce estimates.

FCG Computer Systems, 3 Hamilton House, Mabeldon Place, London WC1H 9BD. Telephone: 01-388 7345. ***Contact: Nick Hayes.***



Holdene Trade Ltd
Stand B6

Holdene Trade Ltd specialises in supplying printers, plotters and VDUs, with associated software, to retail outlets. Holdene has recently been appointed sole UK agents for the Ground Bryan range of digital plotters. The Epson range of printers include the New FX80. 160 CPS unit with optional serial or parallel interface. Other equipment on show includes the low-cost HP7470 plotter, the British-made Insight terminal range and the Newbury Data Printers.

Holdene Trade Ltd, Bray House, Leicester Place, Leeds. Telephone: (0532) 459459. ***Contact: Margaret Smith.***

IMI Computing Ltd
Stand B80

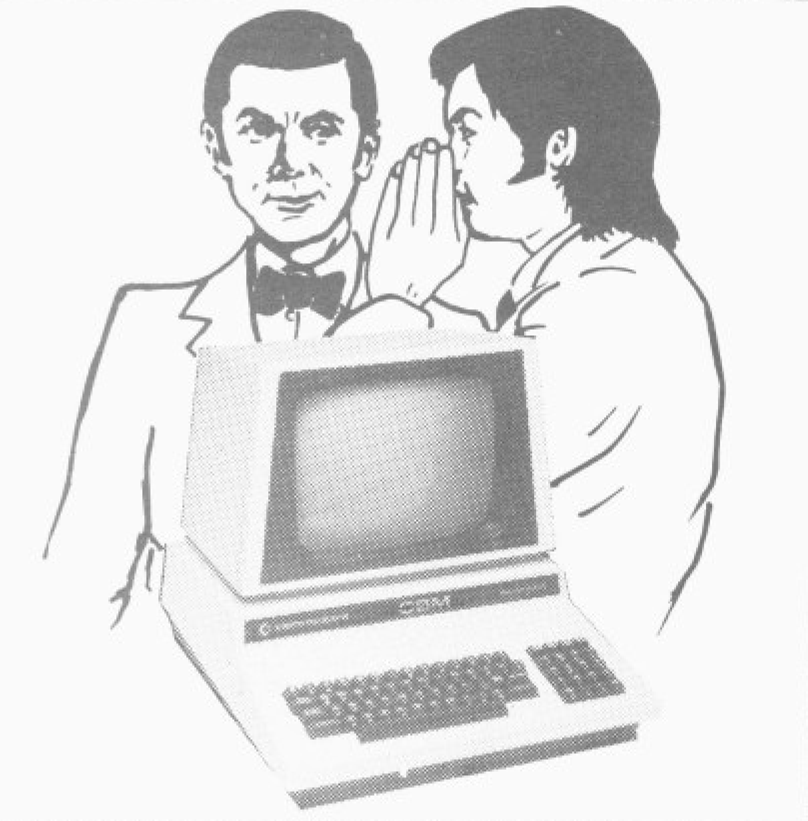
- **The Catering Manager:** A stock control and recipe costing system for industrial caterers and canteen establishments.
- **Microspec:** A cost estimating, specification and tendering package for architects, surveyors and building contractors.
- **Bespoke Software:** As part of a UK Top 100 company we have written and implemented custom-designed software for a wide range of industrial and commercial applications. When packages don't meet your needs, we can.
- **Interfacing and Communications:** We have extensive experience of linking Commodore micros to many devices — including weighbridges, scales, production machinery and industrial probes, as well as other computers, both for receiving and transmitting data signals.

IMI Computing Ltd, PO Box 216 Witton, Birmingham B6 7BA. Telephone: 021-356 4848 ext. 2675. ***Contact: R. J. Burrows.***

IDA International Data Automation Limited
Stand B23

IDA is introducing its expanded range of workstations, trolleys and maintenance aids specifically designed for Commodore Systems. The company has selected desks and trolleys, all Commodore-approved, for the full range of Commodore products including:

- **IDA Systems Trolleys:** A low-cost workstation featuring separate storage shelves for monitors and peripherals, castors for mobility, melamine worktop and is offered in four different sizes.
- **IDA Systems Desk:** A series of ergonomically-designed workstations accommodating all Commodore Systems configurations. They feature special cradles for floppy drives, and separate keyboard platforms positioned below the work surface for maximum comfort. Also available is a workstation with a recess for lowering the computer to the optimum working position.
- **IDA Maintenance Aids:** These include the popular ready-to-use Diskette Head Cleaning Kit, the Uni-Clean Kit with Commodore-approved cleaning diskette, screen cleaner and anti-static spray, and the Technical Maintenance Kit featuring cleaning wands and solutions for tape drives.
- **IDA Computer Accessories:** A wide selection of paper trolleys, forms stands,



TWO WORDS EVERYONE SHOULD KNOW

When buying commodore and its many applications

MASS MICROS

Wellson House,
Brownfields,
Welwyn Garden City,
Hertfordshire.
Tel: WGC (07073) 31436. Telex: 298641.

CBM-64 PET & VIC-20 SOFTWARE

SYNTHY-64 £14.95

Music and sound synthesiser for the CBM-64 has the most sophisticated sound capabilities of any personal computer. However, these facilities are difficult to use from BASIC, requiring a series of 'POKE' commands. SYNTHY-64 makes it easy to create music using simple commands. The package includes a detailed manual and sample compositions.

PIPER £9.95

The music capabilities of VIC are rather less sophisticated than those of the CBM-64, but PIPER provides many of the facilities of SYNTHY-64 to make music composition simple on the unexpanded VIC. A version of PIPER is also available for the PET.

SCREEN GRAPHICS-64 £14.95

Adds more than 20 powerful commands to Basic to plot points, draw lines, circles and boxes, use sprites and even display text with graphics. SCREEN GRAPHICS-64 gives you High Resolution, Multicolour, and Sprite graphics all in one package. Two screens are provided — one for noral text and one for graphics — and you can switch between the two using the function keys or under programme control.

GRAPHVICS £12.95

Provides many of the features of SCREEN GRAPHICS-64 for the VIC with 3K or 8k + expansion.

SPRITE AID £9.95

Define SPRITES on your CBM-64's screen using the keyboard or joystick. Save the sprites as data statements for use in your own program using the 'sprite aid access routine'. A demonstration program and manual are included.

Software is provided on cassette, or on disk for £1.50 extra. Deduct 10% when ordering two or more packages. All prices are fully inclusive. Add £1.00 per item for overseas airmail. Dealer enquiries invited.

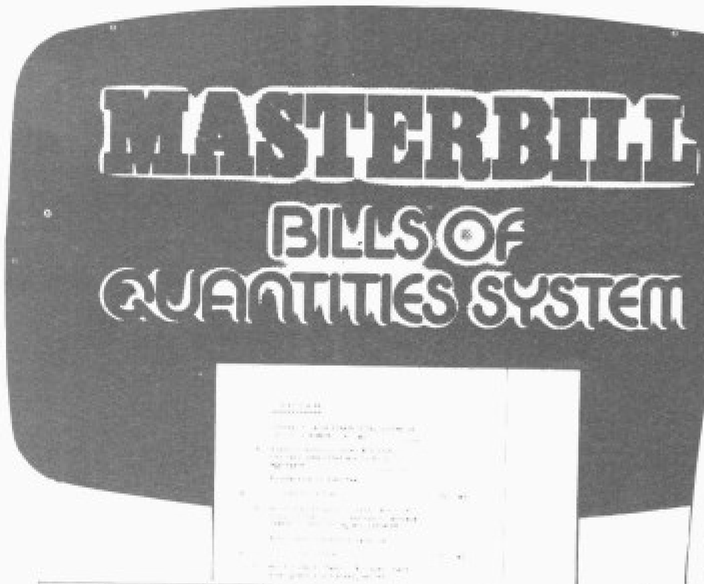
Send SAE for catalogue of games, language and utility software for all CBM computers.

ADAMSOFT,
18 Norwich Avenue, Rochdale Lancs. OL11 5JZ.

BILLS OF QUANTITIES PRODUCTION
on a low-cost micro-computer — with automatic sort, comprehensive library, short codes and cost analysis!

Suites of programs for the Professional Quantity Surveyor which produces Bills of Quantities and Abstracts in varying formats, tender cost analysis in BCIS elements and Cost Breakdown in NEDO categories for post contract and interim valuation purposes.

Masterbill supply a complete package specially designed by Quantity Surveyors for Quantity Surveyors, which is suitable for all organisations — from the small to medium office, branch office or group within a larger organisation.



FOR USE ON THE 8000 SERIES COMPUTER WITH A DAISY WHEEL PRINTER

To complement the B.Q. program we can supply and give tuition on programs for Word Processing, Data Management, NEDO fluctuations, Job Costing — plus the many standard Commodore programs related to the Construction Industry.





MASTERBILL
micro computer systems

St. John's House
23 St. John's Road, Watford WD1 1PY
Telephone: Watford (0923) 38551

Commodore Approved Product

copyholders for word processing installations, and diskette filing systems.

IDA International Data Automation Ltd, 13 Station Parade, Virginia Water, Surrey GU25 4AB. Telephone: 09904 4944. ***Contact: John H. Harris.***

Imperial Chemical Industries PLC
Stand B52/C51

• **Rexagan:** a system which links microcomputers to laboratory and process instruments for data acquisition and process control. It was designed to meet the widely varying needs of ICI scientists and engineers, and is used throughout ICI.

Rexagan forms a versatile, integrated and cost-effective system which can be used by junior technicians or senior engineers alike. It can do several jobs at once — collect data, send control signals, monitor processes, activate equipment, etc. Rexagan comes complete with application and programming instructions in a well-written, well-instructed manual. Valuable software is also provided with each unit. 'Rexagan' is available for all Commodore computers.

• **Super Rexagan:** expandable without practical limit to solve large-scale process control problems. Housed in a rugged but stylish industrial enclosure, it can be supplied for 19-inch rack mounting. Super-'Rexagan' is available for Pet 3000, 4000 and 8000.

• **Junior Rexagan:** an ideal low-cost tutorial interface for microcomputers in schools and colleges. It may be used to teach microcomputer interfacing at all academic levels, alternatively, Junior Rexagan functions as a tool for data acquisition and control of simple experiments in the teaching laboratory. A comprehensive user guide shows how to install Junior Rexagan, provides detailed software and describes experiments to demonstrate its use.

Junior 'Rexagan' is available for PET 3000, 4000 and 8000.

• **Tomult:** a powerful multitasking executive' — a software system to greatly simplify and speed up the writing of complex programs. It is intended in particular for applications in which the microcomputer is used to monitor and control events in the real world. Tomult can be used in conjunction with any of the 'rexagan' interfacing systems. It is unique among multi-tasking systems in that programs may be written, modified and run using Basic. 'Tomult' is available for PET 3000, 4000 and 8000. Price (including user manual) £350.

• **RICS:** the Rexagan Integrated Computer System, a flexible Industrial package including computer, peripherals, interfacing and software in one box. RICS take the elements of a computer-based control or monitoring system and puts them together in one well-designed package for laboratory or industrial use. But RICs doesn't limit your options. RICS gives you a range of choice for each component to suit your needs: it is based on the Commodore 64 microcomputer, which is included in the package. Prices start from £1300, depending upon the options chosen.

Distributor: Dyson Instruments, Sunderland House, Station Road, Hetton, Houghton-le-Spring, Tyne & Wear DH5 0AT. Tel: 0783-260433.

Imperial Chemical Industries PLC. PO Box No 90 Wilton, Cleveland TS6 8JE. Telephone: (0642) 455522. ***Contact: Mrs A E Duggan.***

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW



Impex Designs UK Ltd
Stand B133

Metro House, Second Way, Wembley, MIDDIX HA9 0TY. Telephone: 01-909 0999. ***Contact: G. Barnett.***

Independent Commodore Products User Group
Stand B108/B111

Representatives from this nationwide grouping of over 40 dedicated user groups will be staffing several exhibits at the Show — displaying a wide range of 'public domain' software for the Pet, Vic-20 and Commodore 64 (all of which is available to members through the ICPUG library). ICPUG members are also on hand to answer technical queries.

On Friday and Saturday afternoons (3.30 pm), in the seminar room, all visitors are invited to attend the **Commodore Clinic** — is a forum with a panel of experts happy to answer your questions. Entrance is free.

Independent Commodore Products User Group, 30 Brancaster Road, Ilford, Essex. Telephone: 01-597 1229. ***Contact: J. Cohen.***

Interceptor Micros
Stand B104/105

We are releasing a number of new games for the Commodore 64 also some new software products for the Vic-20 — all at outstandingly cheap prices!

For the 64, games will include: *Frogger 64, Panic 64* and *Startrek*. New will be a complete *assember* package for the Vic. Also *CrazyKong 64, Spriteman* (Pacman) and *Scrabble 64* — plus an amazing new defender game called *Jupiter Defender.*

Interceptor Micros, Lindon House, The Green, Tadley, Hants. Telephone: 07356 71145. ***Contact: Richard Jones.***

INTEX Datalog Ltd
Stand B48

Intex Datalog is exhibiting BONUS!, the comprehensive Payroll system which operates on the Commodore 8096 and 8032. BONUS! has been written to cater for the needs of a wide variety of users. It has an SSP module which determines eligibility and calculates sick

THE 4TH INTERNATIONAL COMMODORE COMPUTER SHOW

pay, even in the most complicated cases. A wide variety of additions and deductions are available, together with the facility to mix weekly, multi-weekly and monthly payrolls on the same disk. Continuous demonstrations of BONSU are taking place throughout the show.

INTEX Datalog Ltd, Eaglescliffe Industrial Estate, Yarm, Stockton, Cleveland, TS16 0PN. Telephone: (0642) 781193. ***Contact: Mike Dunn.***

J.C.L. Software
Stand A26

We specialise in user-friendly, reliable software and hardware for CBM 4000, 8000 and 700 series equipment. We will demonstrate:

- **The JCL MKIII EPROM PROGRAMMER** — the ideal tool for CBM Users wishing to program EPROMS types 2716, 2516, 2732, 2532, 2764, 2564 and 27128 (more to follow). Menu-driven software with 14 functions 6502 disassembler, full disk filing and CBM and JCL Assemler Hex file loading. Custom designed case with a separate power supply. This is the programming CBM uses itself!
- **JCL BUSINESS ROM** containing 4K of invaluable enhancements to CBM Basic. These run-time functions include keyboard input systems, screen editing and file read/write functions. BUSINESS ROM is used by many major UK industrial firms and Government Departments. We will have hotel management and word processing software written using the BUSINESS ROM to show just how effective it is. If BUSINESS ROM clashes with some other ROM in your machine, we have a software-controlled ROM PAGER to switch up to eight ROMS; Greek language version with overstrike facilities is also available.
- **Assemblers and Programming Aids** that are easy to use and combine EDITOR/ ASSEMBLER and DEBUG facilities in one program — cassette based versions for the owners of early 8K 2001 and 3032 machines.
- A new **IEEE 488 Bus Adaptor** for the Vic-20 and CBM 64 which allows use of the serial port and the IEEE bus under software control.

J.C.L. Software, 47 London Road, Southborough, Tunbridge Wells, Kent. Telephone: (0892) 27454. ***Contact: Jacky Leman.***

Jentech Services Ltd
Stand B76

Jentech Services is exhibiting an exciting new development of its DIGITMASTER package — the Commodore 2D computer-aided draughting system. The package will have a second screen option to allow visual display in colour of individual elements and complete drawings similar to typical two-screen systems of much higher cost.

The system allows creation and manipulation of drawing elements which can then be merged to produce a composite drawing very rapidly through a number of flexible routines. This speeds up drawing production. Elements and drawings may be scaled, rotated, mirror-imaged, moved, magnified, reduced, added to or deleted from. Information entry is extremely direct and easy — either in terms of numerical values from the keyboard, or directly by using plotter or Bit Pad entry. Information may be entered directly or relative to the current position or preselected datum points.

The system incorporates powerful lettering and automatic dimensioning which enormously speed up the laborious and time consuming aspects of producing drawings.

The system is menu-driven and full instructions are on screen at all times. This means that operator acceptance is very high. It can be easily tailored for specific applications especially whereby a small component part can be defined by a few key dimensions.

The system is suitable for small engineering companies who cannot afford conventional CAD or for autonomous departments within larger companies.

Jentech Services Ltd, Rosemary Cottages, Nordley, Bridgnorth, Shropshire WV16 4SU. Telephone: 07462 5287. ***Contact: Alan Rae.***

If you're looking for. . .
Word processing
Try these exhibitors:

Audiogenic
CBM Software
Dataview
Kobra
Landsoft
Precision Software
SPT
Superclerk
Supersoft
Tamsys
Viza Software

. . . and most of those listed under 'Business Accounting' will also be able to provide word processing packages.

Kobra Micro Marketing
Stand C56/B57/B58/C59

Kobra Micro Marketing is one of the UK's leading distributors of business and systems software for the Commodore 8000 and 64 computers. Well-known brand-name products on show on the Kobra stand are Calcresult — the only 3D spreadsheet for Commodore computers; Paperclip — the powerful but low cost word-processor: Mupet I and II — the leading multi-user system for Commodore systems: POWER and PAL — professional programming aids: Vic and 64 Switch for low-cost multi-user systems. Other products include Forth, STAT and Diary, for the 64.

Kobra Micro Marketing, PO Box 28, Henley on Thames, RG9 1PF. Telephone: 04912 2512. ***Contact: D.H. Whitehead.***

Landsoft
Stand A71

Landsoft, a company respected for their quality software for the Commodore micros, will be showing their latest payroll and word processing — Payroll 2 and Wordform 700.

Payroll 2 is designed to ease the processing of payroll and statutory sick pay. The program is extremely fast and the simplicity of operation gives new meaning to the networked term "User Friendly". It also handles SSP in what is believed to be the most helpful manner the program can produce a very full analyist and a very useful "wages book". It will produce end of year P14, S(P11s), P60 and P35 listings. It can also print Giros and cheques together with their respected schedules. The program copes with payrolls with, from a couple of employees up to 250 per disk. In fact, Payroll II has no limite as the analyses can be combined from separate disks. The program is in use, not only by companies but, by many accountants and even Bureaux.

Wordform 700 is a truly remarkable word processing program at a remarkably price. It should not be compared just with other Commodore Word Processors but with ALL processors even the dedicated one, by the very nature of its manner of operation, it should become the one by which all others are judged — a bold claim, but one we feel is justified. Wordform 700 will be available from August.

Landsoft, 28 Sheen Lane, London SW14. Telephone: 01-878 7044. ***Contact: Ted Landser.***

L & J Computers
Stand B79

Free advice given on all aspects of Commodore systems and software. Plus our own low-priced programs especially for the small business.

Just approved by Commodore! We have on demonstation our new stocktaking to be completely written up with a detailed item printout and reconciliation in about a sixth of the time that the manual operation would take!

If you have problems reconciling your cash and cheques, then try our low priced **CASHBOOK.** It makes life easy!

Our **OUTSIDE SERVICES** program enables invoicing of customers, when using self-employed labour for outside jobs (eg mini-cabs), to become simplicity itself.

We can normally supply any machine from the

Show Directory



COMMODORE range from stock and above all, we try to give the service customers look for — FAST, EFFICIENT and YESTERDAY!

L&J Computers, 192 Honeypot Lane, Queensbury, Stanmore, Middlesex, HA7 1EE. Telephone 01-204 7525.
Contact: H.J. Goodman.

If you're looking for...
Business planning packages
Try these exhibitors:

CBM Software
Datatronic
Kobra
McDowall Knaggs
Precision Software
Supersoft
Tamsys
Wego Computers

LD Computer Services Ltd
Stand B28

LD Computer Services will be exhibiting its latest integrated accounts package on the new 700 Series computer.

This software is a culmination of extensive development/research and reflects many user-years of experience on the Commodore 2000, 3000, 4000 and 8000 series of computers. The 700 series software fully integrates invoicing, stock control, purchase ledger, nominal ledger, payroll and word processing.

An easy-to-use report writer is also included which allows the user to tailor nominal and stock reports to suit individual requirements. The system is available on all ranges of Commodore disks from the 8050 to the 9090.

LD Computer Services Ltd, Waterwitch House, Exeter Road, Newmarket, Suffolk CB8 8LR. Telephone: 0638 668681.
Contact: Bob Davies.

LLAMASOFT
Stand B132

When you're fed up with dealing with the hordes of Pacman plagiarists and Kong cloners, and you feel that you'd like the challenge of some original games, you need look no further than the quality software from the house of Llamasoft — where all the games are written by Jeff Minter, designer of the famous *Gridrunner* (recently number one best-seller in the USA).

In addition to our five great games for the Vic-20 we now have *Matrix*, a graphically superb and compulsive sequel to the awesome *Gridrunner* running in 8K on the Vic. There will shortly be a Commodore 64 version to join *Camels*, still a great favourite.

Come and meet Jeff on Stand B145 (that is if he's back from the Chicago Fair) and see for yourself that our motto "NOT JUST A PRETTY PACKET" is well justified.

Our quality software is now sold nation and world-wide — but don't take our word for it: come and see for yourselves!

LLAMASOFT, 49 Mount Pleasant, Tadley, Hants RG26 6BN. Telephone: 07356 4478.
Contact: Hazel Minter.

MC² Limited
Stand C62

MC² Limited, 262 The Broadway, London SW19 1SD. Telephone: 01-540 9370.
Contact: Susanne Gabbe.

Microforecast
Stand A16

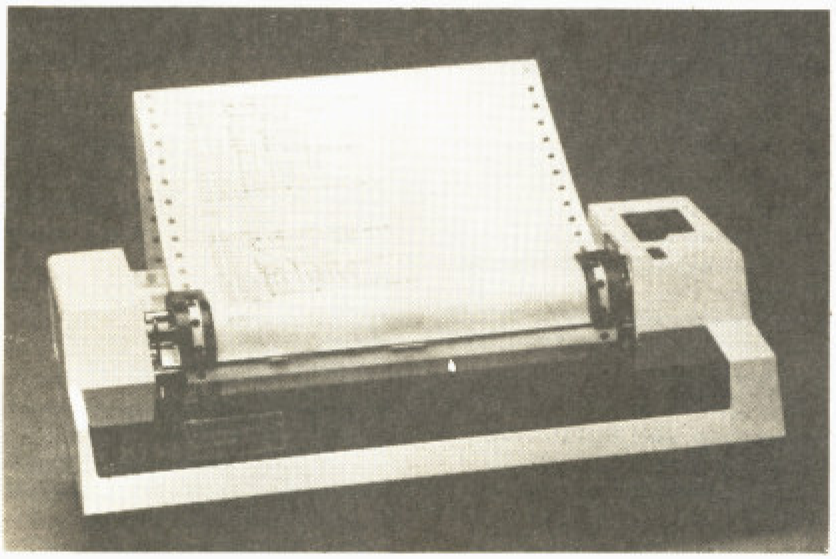
Microforecast is the fortnightly newspaper for Microelectronics. Free copies will be available to anyone who visits our stand.

Microforecast, 31-33 High Holborn, London WC1V 6BD. Telephone: 01-404 0564.
Contact: Jeremy Kenyon.

Micro-Simplex Ltd
Stand B43/B44/B45

Micro-Simplex is the answer to the retailers accounting problems. It allows full recording of VAT and gives you all the information you need for your VAT return. All retailers' VAT schemes are availble together with recording of unpaid bills and outstanding invoices and trading and profit and loss accounts. Simplex-64 is now available providing most

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of the above facilities for £150.00 plus VAT.

Visit the Stand and you will get a pleasant surprise.

Micro-Simplex Ltd, 8 Charlotte Street, West Macclesfield, Cheshire. Telephone: 0625 615000. ***Contact: Mike Dawson.***

Missing Link Computers Ltd
Stand A12

Missing Link Computers Ltd is a North London Commodore Systems Dealer specialising in business and technical applications. In addition to the usual range of packages (accounts, word processing etc.) Missing Link produces a number of highly professional special purpose programs including a low-cost fully-customised database for as little as £249!

TOM (The Office Manager) can be customised to suit your requirements virtually while you wait, saving days (if not weeks) of your time and/or expensive consultancy fees.

TOM can handle most types of information, including customer records, prospects, mailing lists, product information, course records . . . even dental records!

- No artificial restrictions on field lengths or record size (some of our customers have 2500+ characters per record!)
- Full validation on dates (including leap years), numerical fields and special data items.
- Printed reports on any information held on the system.
- Sub-index facility allows you to select any group of records according to specified criteria.

Missing Link Computers Ltd, Abacus House, 53-55 Ballards Lane, London N3. ***Contact: A. Haymes.***

MKA Ltd
Stand B72/B73

FINPLAN is the only true financial modelling system that is available on the CBM 8000 Series: it is a software package which has been developed from many years of modelling experience, bringing mainframe facilities on to a micro. Applications are both financial and non-financial — including budgetting, risk analysis and manpower planning; what FINPLAN does and how it does it is totally in the control of you, the user, although many standard models are available.

MKA Ltd, Shades House, Mealcheapen Street, Worcester WR1 2DQ. Telephone: 0905 612261. ***Contact: Tony McDowell.***

Mills Associates Ltd
Stand B60

Mills Associates is the only independent maintenance company recommended by Commodore to provide comprehensive engineering services on a national basis. We have been active in computer servicing for 20 years and have established a network of 10 regional centres.

- **Full Maintenance Contract:** This is designed for users for whom a minimum of down-time is essential. The service includes two routine maintenance visits each year and a call-out service with 24-hour response and fix times. Replacement loan units for standard equipment are available at no extra cost and the annual contract charge includes all replacement parts, labour, travelling, etc.
- **Fault Repair Contract:** If same-day response is not essential then Mills' low cost fault repair service is the answer. This provides for call-outs on a 72-hour response; and as with the full maintenance contract, all costs are included in the annual charge. Similarly, replacement loan equipment is available at no extra cost.
- **Workshop Services:** We provide a comprehensive range of workshop services for Commodore computing equipment. This includes fixed-price board and unit repairs, cable assembly, PROM programming, unit upgrades and an exchange unit service. We are also able to provide a collection/delivery service using our own transportation or a carrier firm.

Mills Associates Ltd, Wonastow Road, Monmouth, Gwent, NP5 4YE. Telephone: 0600 4611. ***Contact: Andrew Peach.***

Oxford Computer Systems
Stand B106/107

Oxford Computer Systems' stand will be dedicated to the phenominal INTERPOD — a product unmatched for capabilities and versatility throughout the world.

INTERPOD is an ingenious multiple interface that enables the Commodore 64 to make use of the wide range of printers and disk units currently on the market. An intelligent multiple interface which plugs directly into the serial port of the 64 INTERPOD features both RS232 and IEEE interfaces, enabling both ports to be used by the Commodore 64 without any further operation.

Unlike other interface systems, INTERPOD offers, as standard, both RS232 and IEEE interfacing. Additionally,

INTERPOD is the only interface which remains completely transparent both to the machine and the software. The internal memory of the Commodore 64 is not compromised and the system is guaranteed completely compatible with all software because INTERPOD is the only interface which does not use the 64's cartridge slot.

In addition Oxford Computer Systems will be demonstrating the powerful range of compilers and cross-compilers-including PETSPEED, the well-known Basic compiler now available for most Commodore machines including the new 700 series. The compiler can speed up any Basic program by up to a factor of 40. PETSPEED is simplicity itself to use and the 8032 version sells for £125.

Oxford Computer Systems, Hensington Road, Woodstock, Oxford OX7 1JR. Telephone 0993 812700. ***Contact: Vivien Carey.***

Precision Software Ltd
Stand C35/C38/B36/B37

Precision Software Ltd., a leading UK software house, launches today a new suite of software products designed specifically for Commodore computers.

- **SUPERBASE:** Running on the Commodore 700, SUPERBASE sets new standards in file management systems for flexibility and ease of use with large record sizes, fully redefinable multi-screen record formats, spreadsheet-like calculation facilities, fast key access with selective retrieval, stransaction linking, sorting and fully definable record formats. SUPERBASE can also be linked to SUPERSCRIPT II.
- **SUPERBASE 64** is running live on the Commodore 64 on Stand B124.
- **SUPERSCRIPT II** An enhanced version of the popular fully featured word processor. Versatile, fast, simple to learn and use, SUPERSCRIPT II processes letters, quotations, reports, mailshots and standard forms with professional ease, enhancing presentation and ensuring perfect copies every time.

Unrivalled table handling with 240-columns wide screen, scrolling in all directions, arithmetic, memory calculator, column manipulation and mail merge with record selection, 2,100 lines of 80-column text. And it spells!

- **SUPEROFFICE:** The ultimate integrated office administration system with full records management, calculation, word processing and spelling checker. SUPEROFFICE combines the database handling of SUPERBASE with the document editing and formatting power of SUPERSCRIPT II. Available later in the year at £850.

Precision Software specialises in software development and markets through dealers in Europe and North America.

Precision Software Ltd, Precision Software Ltd, Park House, 4 Park Terrace, Worcester Park, Surrey, KT4 7QX. Telephone: 01-330 7166. ***Contact: Nigel Lovett-Turner.***

Pegasus Software Ltd
Stand C50, C51 B64, C65

The twelve months since the last Commodore Show at the Cunard Hotel have been nothing short of stupendous with total sales of Pegasus modules now in excess of 9,000.

To continue the theme, Pegasus will be showing the well established Integrated Accounting Suite comprising Sales, Purchase and Nominal Ledgers, Invoicing, Stock Control and Payroll with SSP.

Further packages are due for release during the summer and expectations are high for the success of these. To complete the picture, the Pegasus stand will feature continuous demonstrations of the software on the new Commodore 700 series microcomputer.

Pegasus Software Ltd, Douglas House, 27 Station Road, Kettering Northants. Telephone: 0536 522822. ***Contact: Stuart Whittaker.***

Paradox Group Limited Vic Computing and Commodore User
Stand B119

You are holding the latest publication from the Paradox Group: this issue of **Commodore User** is a pilot for a full-scale nationwide newsstand launch in the Autumn. The new magazine will be the *first* and *only* magazine to address the full range of potential readers who are interested in Commodore's computers (by choice or by necessity).

For the meantime you'll know our style and our approach from **Vic Computing,** the bimonthly magazine dedicated to Commodore's small computers: and our **Vicwear** operation, selling high-quality tee-shirts and sweatshirts with witty and/or classy Vic-related slogans.

The readership of **Vic Computing** is international, and the magazine's content is almost as wide — from explanatory articles for beginners to our regular query-answering *Tommy's Tips* page, from readers' programs to the masterful insights of columnist Jim Butterfield, from the steely gaze of our *Eye on Commodore* to the regular reviews are run of hardware, programs, books and anything else related to the Vic.

The current issue of **Vic Computing** will be on our stand, along with back issues (single copies £1.00, annual subscription for the UK £6.00). Our stand's Vics and 64s will be running some of the games and other programs featured in **Vic Computing.**

Paradox Group Limited — Vic Computing and Commodore User, 39-41 North Road, London N7 9DP. Telephone: 01-607 9489. ***Contact: Annabel Hunt.***

Quick-Count Ltd
Stand A18

We shall be demonstrating our Time Recording System for Accountants with Sales Ledger on the CBM 8000 series in association with out UK distributers Micro Computation. This has now been in the field for two years, and users comment that "it does the basic best". Micro Computation will also be demonstrating preparation of accounts from Incomplete Records. Regional dealers who specialise in the accountants market are specially welcome.

We shall also be releasing a new Cash Traders' Book-keeping System on the CBM 64, which will be priced at £69.00 + VAT: and the exciting new computer teaching book for under 10s, *Mr Chippie* by Avril Newman.

Quick-Count Ltd, 15, Neeld Crescent, London NW4. Telephone: 01-202 5486. ***Contact: Arnold Shaw.***

Rabbit Software
Stand A128/129

You won't need to look far for the Rabbit stand at this Show. Just head straight for the area with the greatest density of bodies — because we can guarantee that all wise Vic-20 and 64 owners will be anxious to buy our latest games, and our special offers will add additional incentive.

For the 64 we have **PACKACUDA;** you control a barracuda swimming around eating as many fish as possible whilst fighting off the attacks of the ravenous octopi. Then there's **ESCAPE N.C.P.;** you are clapped in the deeper levels of your Commodore 64 memory banks and must work your way up through the N.C.P. to the 10 ports without being de-Resd by one of the 6502 droids.

But those are just two of the six fantastic games we have for the Commodore 64 at this show. There will also be **CENTROPODS, CYCONNES, ANNIHILATOR** and **MONOPOLEE.**

Then there are the Vic games. There will be nine new block busting games for the 20 at the show, all better than anything ever loaded into the Vic before. There's **PARATROOPERS, ANTI MATTER SPLATTER, THE CATCH, ENGLISH INVADERS, PACKACUDA, ESCAPE N.C.P. CRITTERS, CYCLONS** and **RACE FUN.**

But to get on to a more serious note: we also have a constant rolling demo of our amazing business program **INFOMAST** for the Commodore 64.

So don't forget to make the Rabbit stand your first port of call at the show.

Rabbit Software, 380 Station Road, Harrow, Middx. Telephone: 01-863 0833. ***Contact: Terry Grant.***

SPT Electronics
Stand B115/116

QUICK BROWN FOX, the word processing software package from SPT Electronics for the Commodore Vic-20 and 64 computers costs only £60 and has many advanced features — including full line and global edit capabilities, text moving, merging, tab and margin settings, right justification and proportional

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spacing. QBF also automatically reformats edited text, not the tedious paragraph-by-paragraph employed by other programmes. All QBF commands are logical, requiring single key operation; some competing programs require complicated two-finger 'acrobatics' to implement a command.

The QBF software is based on a new design concept that supports a wide variety of printers. QBF is so cunning that an inbuilt program converts the Vic-20 to run on a Centronics parallel interface, allowing you to choose peripher al equipment without the need for adaptors.

Quick Brown Fox works on the Vic-20 5K memory thus freeing more memory for actual word processing. Unique amongst word processing software, QBF can send and receive information from one computer to another via built-in telecommunications facilities: this can be accomplished either by telephone moden or by direct contact via the RS-232 port.

The Quick Brown Fox fully featured word processor system costs less than £1,000. This remarkable wordprocessor breakthrough is achieved by SPT Electronics, combining the QBF Software program with the Commodore Vic-20 or 64 computers, additional memory, 80-column display monitor and a daisy-wheel typewriter/printer. The high versatility of this system would normally only be found in systems costing at least £2,500.

SPT Electronics, Tollesbury, Maldon, Essex. Telephone 0621 868484. ***Contact: S. McCrudden.***

Stack Computer Services Ltd
Stand A130/A131

Following the success of Stack's accessories for the Vic-20, the Liverpool based company have launched new ranges of products for the Commodore 64, Atari and BBC (model B) micros.

Products include utility cartridges, joysticks, lightpens and software multi-cartridge boards, serial and parallel interfaces and cables, dust covers — and more are on the way.

Stack also has new products for the Vic-20, including and IEEE cartridge.

Stack's chairman, Jeff Orr says "we are satisfying a demand in the home computer market that has grown up in the last year or so. While some people have been busy producing software we've gone for hardware/firmwave side of things.

"Stack's products have been extremely successful in the U.K. and we now export to more than 20 countries around the world.

"Our policy is to remain flexible and follow the big-selling micros with our products, for the benefit of ourselves, the dealer and the customer."

Stack Computer Services Ltd, 290/298 Derby Road, Bootle, Liverpool, L20 8LN. Telephone: 051-933-5511.

Stage One Computers Ltd
Stand A21/22

• **The Administrator:** The Administrator is the first choice for processing records which require unlimited information to be stored for either text or accounting or mathematical or history purposes.

Very user-orientated and helpful facilities exist to allow the set up of screen formats for records and menus so that they represent as closely as possible the user's manual system. The user menu facilities allow the completed system to operate like a tailor-made program.

A new and very powerful facility that is built in is the packaes ability to 'learn' a job or sequence for subsequent automatic processing. For example, all month-end reports may be automated and run from a user-defined 'Month End Reports Menu'.

The package provides many unique features not available in other systems: it allows your task to be completed the way you want, and it makes set-up and running simple for the novice user.

Other facilities of the package include searching, sorting, reporting, batch processing, integration with word processing, transaction sorting, analysis and statistics, index viewing or printing, change order of viewing fields on screen, selective reporting, new file creation, record format amendment, full labelling and mailing facilities.

We can honestly say no other package on microcomputers provides such a large number of useful facilities which are presented in so simple a manner for use by unskilled operators. The manual is exceptional and features an easy-to-read training guide with terminology explained and tips, do's & don't and suggestions high lighted.

There are versions of the Commodore 8032 and 8096, priced at £495 and £595 respectively, and there is also a hard disk version.

A demonstration is highly recommended. So come and see us on stand 21 and 22 at the show — we will be pleased to answer any questions you may have.

Stage One Computers Ltd, 300 Ashley Road, Parkstone, Poole, Dorset. Telephone: 0202 735656. ***Contact: Kate Lusher.***

Supersoft
Stand B4/112

SUPERSOFT has been writing software for Commodore computers since 1978 and is now established as one of the leading sources of Pet software and accessories in the world. The SUPERSOFT aim is to offer the best available programs and accessories for all machines that Commodore produce, from the Vic-20 and CBM 64 to the 700 series and beyond.

This year software for the 64 features prominently on the SUPERSOFT stands, with programs like BUSICALC and BUSIWRITER for the business user, and a range of games including CRAZY KONG, KAKTUS, TANK ATAK, MANGROVE and STIX for the arcade addicts. Hobbyists will find a range of programming aids and utilities to make life easier — such as VICTREE which adds Basic 4 style disk commands and toolkit functions; and 1541 BACKUP, which enables disk users to make security copies on a single drive is a must for all serious users.

More than 1,000 owners of 3000, 4000 and 8000 series machines have installed SUPERSOFT's low cost high resolution graphics boards. Now GRAPHIX software is available for the 64, making it easy to plot points, draw lines, and display text on the high resolution screen of the 64.

Calling all programmers! If you think that your programs are good enough to get into the SUPERSOFT catalogue you should contact us immediately.

STOP PRESS: *on display at the Show for the very first time will be BUSICALC 2, faster and more powerful than BUSICALC, but still very competitively priced.*

Supersoft, Winchester House, Canning Road, Wealdstone, Harrow, Middlesex, HA3 7SJ. Telephone: 01-861 1166. ***Contact: Peter Calver.***

Sunshine Publications
Stand B114

We will be there with the latest issue of **Popular Computing** Weekly and of course all the available back issues in case you missed any.

We will also have our latest publication **"The Working Commodore 64"** for sale on the stand and at a specially reduced show price of £4.95.

Sunshine Publications, Hobhouse Court, 19 Whitcomb Street, London WC2. Telephone: 01-930 3266. ***Contact: Duncan Scott.***

Superclerk
Stand B27

Ever dream of getting SUPERCLERK to help with the boring paperwork in your office? He could use his X-ray vision to pick out just the information you require from your files, and then type letters and reports at super-human speed while you drink coffee. It needn't be a dream!

SUPERCLERK is a program that turns any 8032/8096 or 700 Commodore computer into an easy-to-use tool for typing and filing. Optional accounts modules even allow SUPERCLERK to take care of the book-keepking too.

SUPERCLERK assumes you know nothing about computers, and offers help at every stage. Really simple to

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use; no training courses required; ideal for the general office or small business.

But beneath that meek and mild-mannered exterior are some powerful advanced features. You can 'pause' in the middle of any function; use the calculator or electronic jotters or many other unique facilities, and then continue instantly with whatever you were doing.

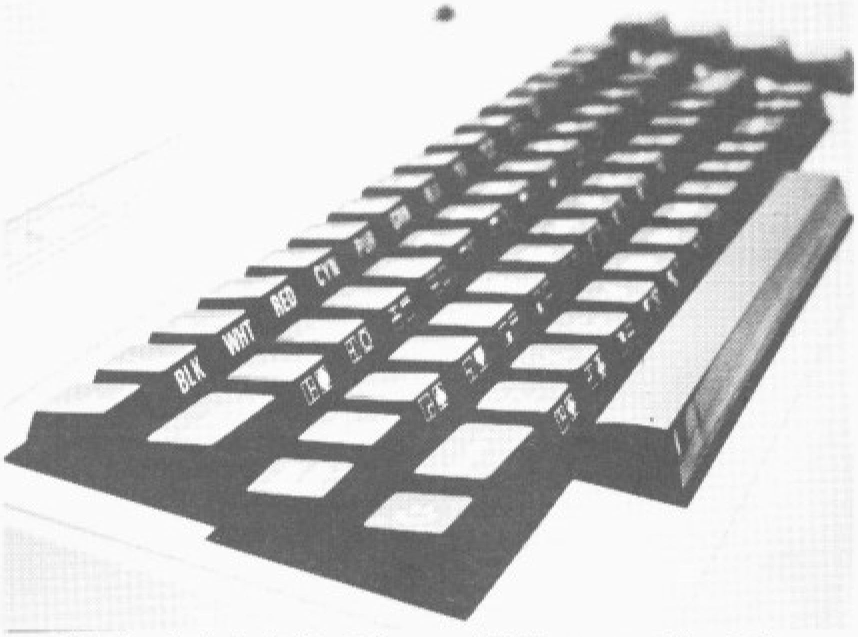
SUPERCLERK includes a special Business Basic programming language, and more experienced users can alter SUPERCLERK or add new functions. In technical terms SUPERCLERK provides fully integrated wordprocessor, database, sales/purchase/ nominal ledgers/ payroll/and many utility functions. Prices from £395.

Superclerk, 129A Market Street, Chorley, Lancashire, England, PR7 2SG. Telephone: 02572-78376. ***Contact; Chris Hicks.***

Tamsys Ltd
Stand B34

TAMSYS is one of the leading software distribution companies in the UK, representing most of the major producers of software for Z80 and 8085, 8086, 8088 based machines. As main distributors for both Digital Research and Microsoft, they will be exhibiting a wide range of these companies products on Commodore equipment. Also on show will be other leading CP/M and MS-DOS based products including dBASE II, Wordstar/MailMerge, and Supercalc. TAMSYS will also be featuring the CP/Maker, a CP/M board for 4000 and 8000 series machine which not only converts these machines to CP/M but also increases their capacity in Pet mode to 96K.

The TAMSYS consultants on the stand will be pleased to



provide technical help and assistance relating to CP/M and MS-DOS as well as providing up to the minute details of the TAMSYS education and training programmes.

Tamsys Ltd, Pilgrim House, 2/6 William Street, Windsor, Berkshire SL44 1BA. Telephone: Windsor 56747. ***Contact: Patricia Oldcorn.***

Taylor Wilson Systems Limited
Stand A68

Taylor Wilson has developed four highly innovative and sophisticated packages based on the Commodore micro-computer which can be seen at the show.

- **AUTOPLAN:** A powerful, comprehensive two-dimentional computer-aided draughting system.

AUTOPLAN can quickly generate high quality, full detail architectural or production drawings. The package comprises: a Commodore 8032 micro, a Commodore twin-drive floppy disk system as an 'electronic plan chest', to store drawings or to hold programs which are in operation; a choice of hi-speed plotter/digitisers. The plotter is used both for inputting and producing drawings.

Full editing of shapes and texting is available with the system.

- **TOOLPATH:** created to verify CNC lathe programs by simulating the action of the machine-tool controller — TOOLPATH was originally produced for the training of NC programmers. It gives a high-resolution animated display of tool movement and metal shaping, and is widely used in training establishments in the UK, Europe and Australia.
- **TAPEPREP:** a highly flexible and versatile package for the preparation, editing and punching of NC machine tool program tapes.
- **MILLPATH:** MILLPATH gives a near 3D simulation of how a machining centre will execute a CNC part program, drawing at high speed on an X-Y plotter to any pre-set scale and using different coloured pens to show the varying depth of cut. Utilising MILLPATH it is possible to check for errors on a part program away from the shop floor removing the risk of potential damage to the machine tool or its tooling. Because of this it is ideally suitable for training.

Taylor Wilson Systems Ltd, Station Road, Dorridge, Solihull, West Midlands B93 8HQ. Telephone: 056 45 6192. ***Contact: J. G. Waring.***

Technical Software Centre
Stand A14

- **PLAN-KIT** Whatever the project, from organising a conference to equipping a factory or building and commissioning a power station, PLAN-KIT helps you to control and co-ordinate every activity and its timing.

PLAN-KIT is easy to use, you don't have to be a computer expert, and you can key in up-to-date information at any stage to obtain a new analysis of your project's progress.

PLAN-KIT can handle over 500 activities: produces one of the most advanced and easily read bar-charts available on computer: uses the precedence system (no dummies needed): offers the choice of running with calendar

or continuous time base... plus many other features offered by this comprehensive planning package.

- **Building Services Programs:** Save time and money with this practical suite of programs which copes with the calculations while you concentrate on the design and choice of parameters.

Originally written by a leading mechanical/electrical contractor, following CIBS standard procedures, these microprogams have now been developed in the Tecpac format to provide a cost-effective suite of 4 related packages.

Individual programs can also be obtained from Tecpac, prices on request. Also available to special order: programs on Daylighting, Floodlighting, Heating, Pipe Sizing, CWS, HWS, Noise calculation.

Technical Software Centre, BHRA, Cranfield, Bedford MK43 0AJ. Telephone: 0234 750102. ***Mrs R. Chandler.***

Tirith Ltd
Stand B63

On Display will be the Crompton Personal Computer Desk, the Crompton Workstation and the Crompton Printer Stand. The Personal Computer Desk has been ergonomically designed to take any combination of Commodore hardware, but especially the CBM 500 and 700 series: the Computer Desk has a black leathercloth top and black metal frame, is mounted on castors and has a concealed cable tidy which runs along the back of the desk. A four gang 13 amp socket is mounted under the desktop which allows the paper to come through the slot or round the back of the desk into the printer. A paper catcher is available for the print-out. There are seven standard models with various combinations of top extensions and disk drive shelves.

The Crompton Printer Stand is designed to accommodate the complete range of printers. The stand incorporates a paper feed slot which can be fed by the paper tray beneath; there is a paper catcher at the back for the printout.

Tirith Limited, Pear Tree House, Woughton on the Green, Milton Keynes. Telephone: 0908 679528. ***Contact: Mr G.W. Wright.***

Vic Soft
Stand D5

Vic Soft will be displaying Commodore's successful range of arcade games and software programs for the Vic-20 colour computer. In one area, visitors will have the opportunity to play several different arcade games or try out new ones which have not been released.

Seventeen new ROM-based games will make their debut at this year's Show and VIC Soft will have all of them available for demonstration. Visitors will also have the chance to choose from the extensive VIC Soft catalogue and purchase their favourite games or software programs for the Vic-20 or the Commodore 64.

Vic Soft, Commodore Business Machines, 675 Ajax Avenue, Trading Estate, Slough, Berkshire SL1 4BG. Telephone: Slough 74111. ***Contact: George Furmage.***

VIC-20 and Commodore 64
Stand D6

Part of the Vic-20 feature area, stand D6 will have a number of Vic-20 and Commodore 64s set aside to show the user exactly what each type of computer is capable of. There will be rolling demonstrations of popular software programs such as *Introduction to Basic Part I and Part II* and the full range of utility programs for the home.

Of particular interest is the latest 3D game called *Soccer* which utilises the remarkable sprite facility of the Commodore 64. Also on show will be the range of Vic-20 and Commodore 64 peripherals which harness the power of the computer and exploit its full potential. Commodore staff will be on hand to give demonstrations to visitors and a few machines will be available for 'hands on' experience.

Commodore Business Machines, 675 Ajax Avenue, Trading Estate, Slough, Berks SL1 4BG. Telephone: Slough 74111. ***Contact: Adrian Butcher.***

VIZA SOFTWARE
Stand B117

Viza will be exhibiting **VIZAWRITE 64** a high perfromance, low-cost word processor designed especially for the Commodore 64. It takes full advantage of the colour, graphics and memory capabilities of the computer to bring you the power and style of a dedicated word processor.

Serious word processor users expect their word processor to format their text as they type, VIZAWRITE 64 does this instantly. Tabs, indentation, centering are all clearly visible and easily altered, so you know exactly the format of your text all the time.

VIZAWRITE 64 is a disk-based word processing program. Cost: £69.00 plus VAT (£79.35).

Also on show will be the **Commodore 700** and **VIZASPELL.**

Viza Software, 9 Mansion Row, Brompton, Gillingham, Kent ME7 5SE. ***Contact: Kelvin Lacey.***

VNU Business Publications
Stand A25/A126

VNU Business Publications bring you its successful microcomputer titles:

MicroDecision — the leading microcomputer magazine for businessmen. Written in non-technical jargon-free language with applications directly related to your business.

Computer Answers — a lively informative microcomputer magazine that is specifically directed at the *end user.* It guides the reader towards the understanding needed to optimise and expand his kit.

What Micro? — the definitive *buyer's guide* to microcomputer hardware and software. Each month there are news, views, comparative reviews, bench tests and user panels all geared to the *Buyer.*

Personal Computer World — on sale at newsagents every month for 85p, Britain's largest selling micro magazine. It covers the whole spectrum of microcomputing with news, reviews and up to the minute benchtests on current hardware and software.

Personal Computer News Britain's leading weekly microcomputer magazine. Special features include regular Top 20 sales charts, program cards and a pull-out library of microcomputing. First with news and reviews, PCN costs 35p every Friday.

VNU Business Publications, 62 Oxford Street, London W1A 2HG. Telephone: 01-323 3211 ext. 376. ***Contact: S. Holliday.***

Vulcan Electronics
Stand B103

Vuclan Electronics, actively established in the chess and home computer markets, is now distributing a new product to complement its expanding range of exciting hand-held games and Spectravision cartridges (suitable for use on Atari VCS).

The new **Quickshot Joystick** by Spectravision is suitable for use with the Atari VCS and both the Vic-20 and Commodore 64 home computers. It is an excellent step up from the standard joystick with a full 360° pivot and extra fire button making the unit ideal for both left and right handed players, in addition to a moulded grip for extra comfort.

It is a design based on the latest of arcade-type machines and can be stuck on to any smooth surface with the aid of four suction pads. It is exactly what game players have been waiting for and since its introduction in March of this year it has become an accepted add-on for Commodore computers.

It retails at £11.95 and is available from most computer shops and games centres all over the country.

Vulcan Electronics Ltd, 200 Brent Street, Hendon, London NW4. Telephone: 01-203 6366. ***Contact: David Bishop.***

Wego Computers Ltd
Stand B66/67

Wego Computers' stand will be divided into two sections. The first will concentrate on their work as a Commodore Dealer and will feature ancillary products for the Commodore range.

These include the Commodore-approved Card Reader, Sequence Switch Boxes — which allow the computer and up to four peripherals to be powered up in the correct sequence with only one switching operation, and BackPack — which prevents data being lost because of power cuts or line surges.

The second section will display the WordPro series of software packages including. WordPro 2,3,4,5; WordPro 3 plus/64; and Power.

Wego Computers Ltd, 22a High Street, Caterham, Surrey CR3 5UA. Telephone: 0883 49235. ***Contact: Geoff Duck.***

Downstairs — mostly Vic and 64 applications:

Company	Stand
Anirog	B124
A.S.K.	B125
Audiogenic	B101/102
Beaumont Summer Camps	A127
Bubble Bus	B118
CDS	B121
Commodore Computing	B120
Commodore Education	D4
Commodore User	B119
Commodore Vic	D6
DAMS	B113
ICPUG	B108/111
Impex Designs	B133
Interceptor Micros	B104/105
Llamasoft	B132
Oxford Computers	B106/107
Paradox	B119
Precision Software	B122/123
Rabbit Software	A128/129
SPT	B115/116
Stack	A130/131
Sunshine Publications	B114
Supersoft	B112
Vic Computing	B119
Vic Soft	D5
VNU Publications	A126
Vulcan Electronics	B103

Upstairs — mostly business applications:

Company	Stand
Alphatronic	B31/C32
Anagram	B40/42/C41
Automation Facilities	B5
Binar Israel	B7/B8
CBM Dealer Cooperative	A24
Claremont Controls	B61
Commodore Computing	A20
Commodore Concessionaires	B3
Commodore New Products	D2
Commodore Software	D3
Commodore Sales Training	C9/C10
Compsoft	A11
Computastore	B1/B2
Computer Room	B39
Computer Services Midlands	B54/55
3D Digital Design	B77/78
Datatronic	A13
Dataview	D1
DDM Direct Data Marketing	B69/70
Dynatech	A29/30
FACTS Software	B46/47
FCG Computer Systems	B72/73
Holdene Trade	B6
ICI	B52/C51
IDA	B23
IMI	B80
Intex Datalog	B48
JCL Software	A26
Jentech	B76
Kobra	B57/58/C56/59
L&J Computers	B79
Landsoft	A71
LD Computer Services	A28
McDowall Knaggs Associates	B72/73
MC2	C62
Micro Forecast	A16
Micro Computation	A18
Micro-Simplex	B43-45
Mills Associates	B60
Missing Link Computers	A12
Pegasus Software	B51/64/C50/65
Precision Software	B36/37/C36/37
Quick-Count	A18
Supersoft	B4
Stage One Computers	A21/22
Superclerk	B27
Tamsys	B33/34
Taylor Wilson Systems	A68
Technical Software Centre	A14
Tirith	B63
VNU Publications	A25
Wego	B66/57

Kids, holidays and computers

where to learn computing



It's going to be a long, hot summer of course. Or maybe it will rain all the time (again). Either way there's nothing worse than a bored child during the long school holidays.

One solution: residential 'activity' holidays, usually lasting a week or two and combining a variety of activities. And there are a number of organisers with courses that are especially appropriate for kids with an interest in computers.

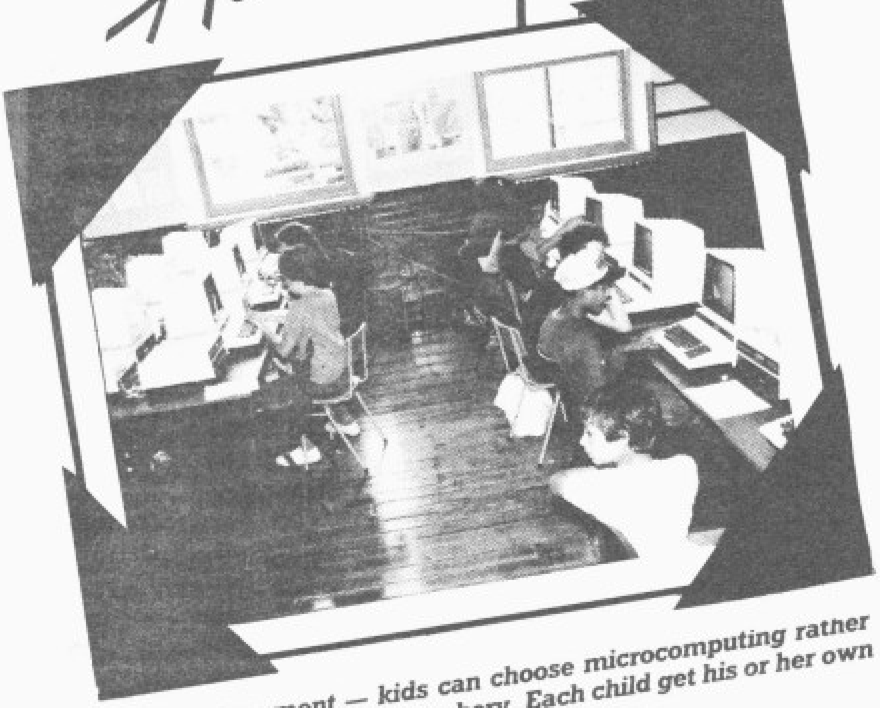
Here are some of the options we found. Most of these mix some computing with a variety of outdoor pursuits during the course, which can't be a bad thing. And the computing itself isn't necessarily just solitary programming — group project work is usually the norm, with sidelines like elementary robotics part of the syllabus. Sounds good!

Colony Holidays, Linden Manor, Upper Colwall, Malvern, Worcs. Phone 0648 40501.

Charitable Trust running residential activity holidays based on the French 'Colonies des Vacances' system — as well as computing they take in crafts, drama, music, bird-watching. On the 13-day holidays (begin on a Sunday and end on a Friday) children spend three hours a day on the computer. As well as providing a basic introduction, there is also an emphasis on computing being part of the general activities at the camp; computing in inter-use with the other activities — eg the



Computer Holidays



This is Camp Beaumont — kids can choose microcomputing rather than canoeing, judo, sailing or archery. Each child get his or her own machine to work on (disks, too!)

production of a camp newspaper. Groups of six are supervised by one monitor, with a micro to every two kids.

Prices: *£159 for two weeks inclusive of travel — pocket money limited to 50p a day.* ***Dates:*** *31 July-12 August; 14-25 August.* ***Location:*** *Over 20 rural centres throughout the UK, including some fine country houses.*

Gainsborough House Hotel, Bwedley Hill, Kidderminster, Worcs. Phone 0562 754041.

Residential weekend courses and weekly evening classes aimed at a mixture of children and adults (aged 16-65). Essentially an introduction to the basics of computing, with added emphasis on the social occasion. There are 20 places in a class, with one micro to two people; the course leader is the sole supervisor. The weekend courses last from Saturday morning (check in Friday evening) to Sunday afternoon; the weekly ones are organised as 10 two-hour sessions running over 10 weeks.

Prices: *Weekend session — £55 (includes full board and there are full hotel facilities); weekly night classes — £20.* ***Dates:*** *For the weekend sessions the dates for September, October and November have not been finalised yet, so ring for details.* ***Location:*** *At above address.*

YHA Adventure Holidays, Youth Hostels Association, Trevelyan House, St Albans, Herts. Phone 0727 55215.

Charitable trust. Computing course holiday, solely residential, for 11-year-olds up to adults: mainly practical work with a little history thrown in. The all-day course has a class size of 10 with two staff per class; everyone gets a computer to themselves. Additional benefits of the course include automatic membership of the YHA, a discount for rail travellers to the centre and free insurance.

Prices: *Residential — £120 (includes instruction, board, lodging and recreational facilities).* ***Dates:*** *16-23 July, 30 July-6 August; 6-13 August; 13-20 August. Course duration of one week, from Saturday to Saturday.* ***Location:*** *Bath Youth Hostel, Bathwick Hill, Bath.*

Octopus Computing Holidays, Oxford Computer Training Services, Junction Road, Oxford. Phone 0865 711829.

Residential and non-residential courses for children and adults. Organised at three levels: introductory, intermediate and advanced, with emphasis on practical work — there is very little theory. All-day computing, though people *can* adapt their schedule (eg. computing in the morning, an afternoon off, more computing in the evening). Class size varies from 5 to 15 and saff/child ratio is about 1:6 — equipment is operated under close supervision. There are facilities for other activities, and accommodation is either in college residences or with local families.

Prices: *Residential — £115; non-residential — £70.* ***Dates:*** *Season lasts from 20 July to 3 September and is organised in six-day sessions from Monday to Saturday.* ***Location:*** *At above address.*

PGL Holidays, 110 Station Street, Ross-on-Wye, Herefordshire. Phone 0989 67681.

Residential computer holidays for children (ages 8-16, organised into three groups). Instruction at three levels — computers, robotics, 'psycho-bionics'.

A beginner should be able to write their first program within the first hour of instruction. The intermediate range will start at a higher level; with robotics children will learn how to control and build their own robot. it is mainly practical work. Structurally, the holiday is broken up into half-day computer classes and the other half spent engaged in a mixture of sports and outdoor activities. Class size between 6-15, with a staff/child ratio of 1:5; staff consisting of qualified and experienced teachers.

Prices: *Residential — £130 (includes station pick-up).* ***Dates:*** *16-23 July; 23-30 July; 6-13 August; 13-20 August. Courses last from Saturday to Saturday.* ***Location:*** *Eastbourne or Edinburgh.*

Millfield Summer School, Millfield Village of Education, Street, Somerset. Phone 0458 42291.

Residential and non-residential computing courses from a public school famous for its sports facilities and coaching. All the computing courses are "suitable" for those with an aptitude towards maths. The courses are organised into two sections: the first one for kids between 8-13 (each child has a computer and most of the work is practical). The second group is for adults and young people of 14 years and over. This latter course is further divided into morning introductory classes for those who have little or no experience; afternoon courses take place at a higher level, and some experience will be necessary. Again, every person has his or her own computer. Class size in both cases is limited to 12 with one instructor per class. The courses are organised so that you spend half a day on computing and the rest on some other course; adults take part in at least one course occupying their first day.

Prices: *Residential — £63; including board + VAT — £120. Non-residential — £30.* ***Dates:*** *8-12 August and 15-19 August are the only free dates left. These last from Monday to Friday.* ***Location:*** *At above address.*

Oakham Activity Holidays, Oakham School Chapel Close, Oakham, Leics. Phone 0672 3072.

Residential or non-residential computing courses — basically aimed at adults, but also for accompanied children (ages 9-14). Organised so that you can either choose to do computing all day, or spend half a day on the computer and the rest of the day on recreational activities for which there are 'numerous' facilities. Class sizes are usually 10 to 12 people (two per computer is the norm). It's mainly practical work, the teaching led by the director of the course assisted by up to three computer studies undergraduates. The course lasts six days.

Prices: *Residential — Adults £120, children £100. Non-residential — adults £60, children £50.* ***Dates:*** *24-30 July; 1-6 August (virtually full); 7-13 August (all-day computing courses only, but games facilities are open).* ***Location:*** *At above address.* □

RTTY on the Vic ...

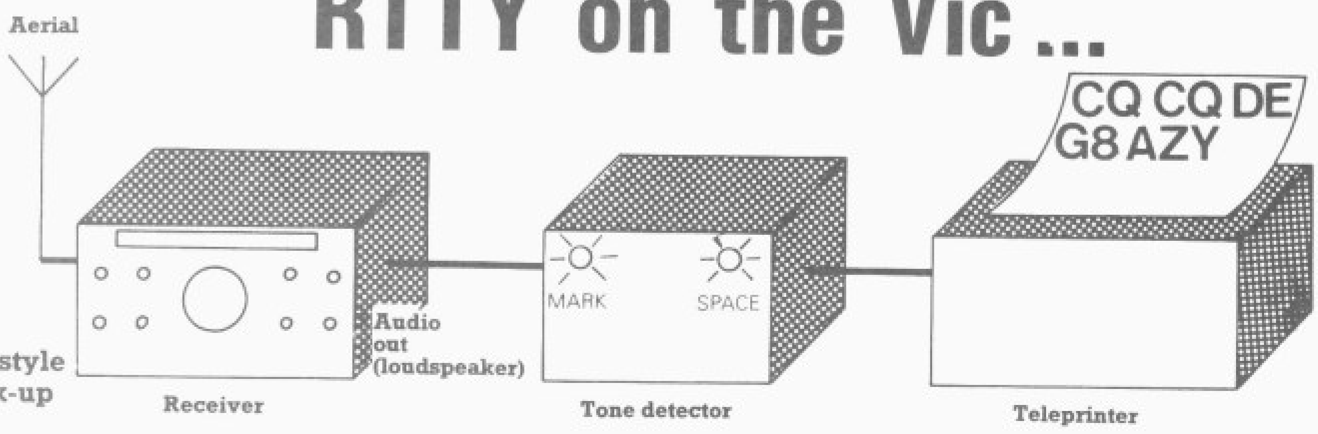


Figure 1: Old-style teleprinter hook-up

If you tune around a short-wave receiver, you'll hear an incredible array of signals from commercial short-wave broadcasts from all corners of the globe to Radio Amateurs talking to each other.

You'll hear morse code messages being sent by everyone from Radio Amateurs to foreign diplomats.

You'll hear the 'woodpecker' noises emanating from somewhere inside the USSR doing something that none of us is too sure about. You may even hear the bleepings from space satellites. And you'll certainly hear the regular warbling noises which are the sound of text being transmitted from one place to another — by Radio Amateurs, embassies or the world-wide news agencies such as Reuters.

Figure 3: RTTY codes

DATA bits	LETTERS all codes	FIGURES BAUDOT	CCITT no2	TAL UNIT	TDK-20
54321					
00000	blank	blank	blank	blank	blank
00001	E	3	3	3	3
00010	line feed	line feed	line feed	car ret	line feed
00011	A	–	–	–	–
00100	space	space	space	space	space
00101	S	bell	'	'	'
00110	I	8	8	8	8
00111	U	7	7	7	7
01000	car ret	car ret	car ret	line feed	car ret
01001	D	$	wru	bell	*
01010	R	4	4	4	4
01011	J	'	bell	bell	&
01100	N	,	,	,	,
01101	F	!	!	%	;
01110	C	:	:	:	:
01111	K	(	(	(	(
10000	T	5	5	5	5
10001	Z	"	+	+	+
10010	L	)	)	)	)
10011	W	2	2	2	2
10100	H	#	#	#	%
10101	Y	6	6	6	6
10110	P	0	0	0	0
10111	Q	1	1	1	1
11000	O	9	9	9	9
11001	B	?	?	?	?
11010	G	&	&	?	$
11011	figures	figures	figures	figures	figures
11100	M	.	.	.	.
11101	X	/	/	/	/
11110	V	;	=	=	=
11111	letters	letters	letters	letters	letters

NOTE: All codes are exactly the same for letters and figures, it is only some punctuation and control characters that differ. The "wru" is a "who are you?" query which the receiving station would normally answer with some sort of identification code and "car ret" is carriage return.

This type of signal is referred to as 'RTTY' — which stands for Radio TeleTYpe; it is a means by which text can be sent over the air.

RTTY (or "ritty", as it is often pronounced) started shortly after the Second World War, when the old mechanical teleprinters were becoming readily available: most of the techniques and codes currently in use arise from the design and limitations of these early machines. Although many still use these mechanical (and noisy) teleprinters, increasing use nowadays is being made of computers to convert the signals to text and display it on the screen, and there are several ways of doing this on the Vic.

Figure 1 shows the hook-up required with the old mechanical teleprinters: and **Figure 2** shows the more modern approach.

The four fundamental requirements are a short-wave receiver, a tone detector, a computer to do the code conversions and a display to show the final text. Although it is possible to build your own tone detectors and write your own software, the necessary hardware and software for the code conversions are already included in two commercial packages available for the Vic.

Most computers and VDUs use some form of the seven- or eight-bit ASCII code, but the design of the early mechanical printing machines dictated that a special code using only five bits was used.

Code types

Two main types of this code are specified, although they are both identical in their treatment of letters and numbers, differing only in the handling of punctuation characters as can be seen from **Figure 3.**

The five-bit character is sent as a series of ones and zeroes. These are actually referred to as *mark* (current ON) and *space* (current OFF).

Figure 4 shows how the letter 'J', whose code is 01011, would be transmitted.

With nothing being sent, the signal sits at high level (*mark*) which is pulled low (*space*) to indicate that a character is about to be sent. This special 'start' pulse is then followed by the five bits of the character (transmitted starting with bit 0); and a final *mark* (or 'stop' pulse) is transmitted — slightly longer than the others to allow the receiving machine to finish printing.

The sender is now back in its 'idle' condition ready to send the next character.

It doesn't take much mathematics to realise that five bits only allow a total of 32 characters to be sent. If you look at Figure 3 you'll see all 32 code combinations and their representations — the peculiar order of letters is a function of the mechanical decoding process used in those early machines.

You will also see that there are two columns — a 'letters' column and one for 'figures'; and there are special codes (11011 and 11111) to switch the receiver to 'figure' or 'letter' mode.

possibilities and products

by Mike Todd

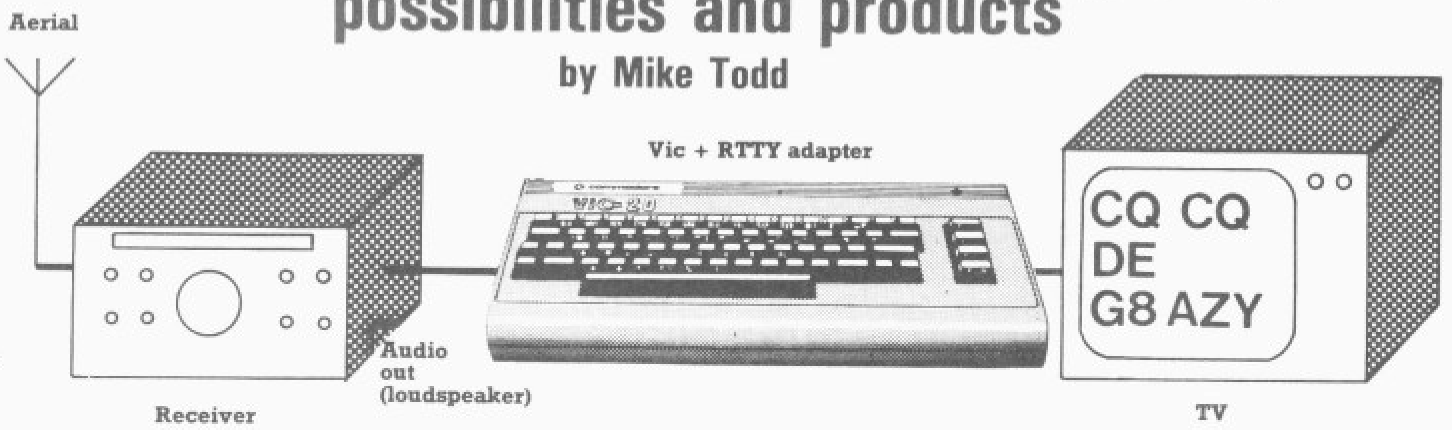


Figure 2: Vic and RTTY

Radio amateurs in the UK must, by law, use the five-bit International Telegraph Code number 2 and also must send at a speed of 45.5 or 50 baud. (A baud is just a measure of the speed of transmission and can generally be accepted as the number of bits per second. If the 'width' of one bit is 20 milliseconds, the rate is 50 baud.)

The stream of ones and zeroes cannot be transmitted as it stands; it must be converted into an audio signal for transmission. By assigning one audio frequency tone to a mark and a different one to a space, it is possible to put together a complete audio signal which is the warbling noise that is heard on the short wave receiver.

Frequency shifts

The actual tones chosen depends very much on who is doing the sending, but radio amateurs generally stick to 1.275kHz for *space* and 1.445kHz for *mark*.

This is often generated by having an oscillator running at 1.275kHz and then shifting its frequency up by 170Hz when there's a *mark* signal to be sent. The technique is referred to as *audio frequency shift keying* or AFSK.

There is another technique used where the actual tones are not transmitted. Instead the carrier frequency of the transmitter is shifted by the same amount. This is known as FSK. Assuming that we're transmitting on a frequency of 14090.000kHz, this would be our *space* frequency; and a *mark* would shift this to 14090.170kHz. For those with receivers designed to receive morse code or 'sideband' transmissions, it is possible to convert this shift in carrier frequency back into audio tones.

Apart from the radio amateur transmissions, there are also a host of commercial transmissions — including Reuters, TASS, weather stations and even embassies round the world: and these use a variety of different sending speeds and frequency shifts.

Reception

Receiving a signal is a matter of feeding the incoming audio tones into two tone detectors. One triggers on the *space* frequency and the other on the

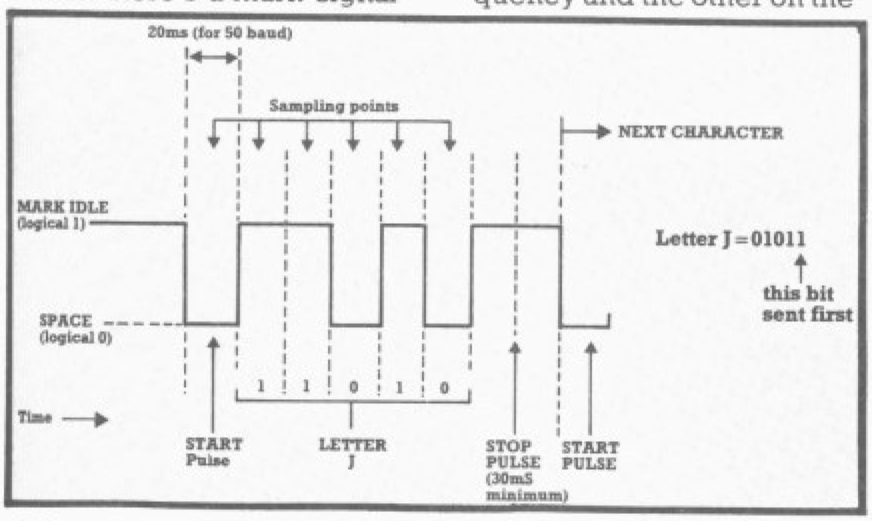


Figure 4: Transmission of the character 'J'

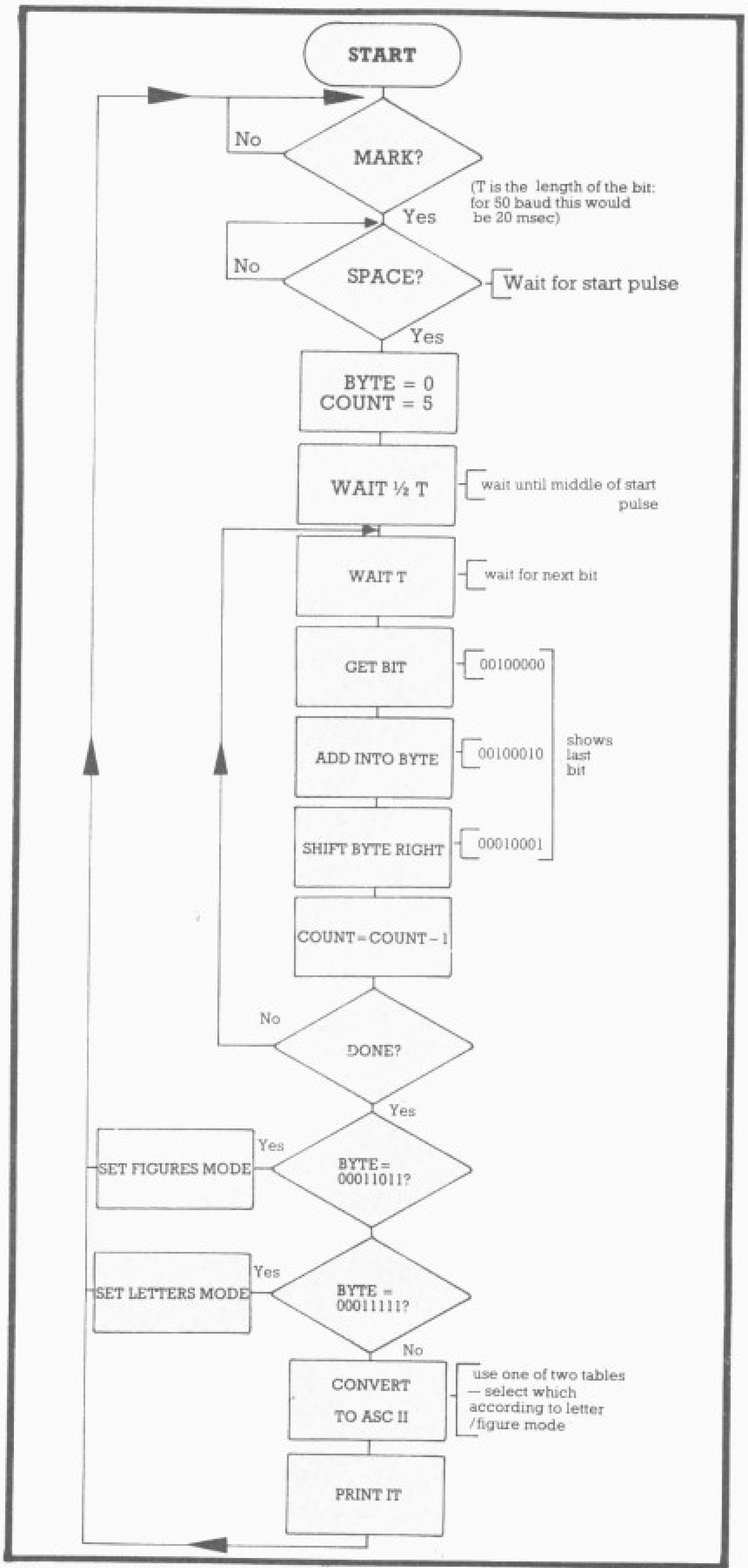


Figure 5: Simple flowchart for assembling and printing RTTY

mark frequency, producing a logical '0' or '1' at the output. Although it is possible to use only one detector, two are better: and they provide a degree of error-checking since if neither tone is being received no decoding should take place. (If only one detector were used, it would assume that a *space* was being received even if there was no tone present.)

The serial stream of ones and zeroes can either be fed into a hardware device known as a *Universal Asynchronous Receiver Transmitter*, or UART, for conversion into a parallel byte. Or a software equivalent of the UART might be used, with the software alone performing the conversion.

The flowchart in **Figure 5** shows the basic principle involved. Note that once the start pulse is received we wait an extra half time period — this is to make sure that we continue sampling in the middle of each pulse for maximum reliability.

Transmitting the signal is slightly easier as far as the computer is concerned. It is simply a matter of presenting the ones and zeroes at the correct speed into a suitable audio oscillator for feeding into a transmitter — though it is useful to have computer control of the transmitter to turn it on when sending.

As I've already mentioned, it is possible to build your own tone detectors and to write your own software to decode the signal: but this requires a good understanding of the techniques of RTTY, the Vic itself, and machine-code programming too.

The alternative is to use one of the two commercially-available units — all you need is the receiver and the Vic, and a few other bits and pieces.

IDK-20 Ham Interface

This comes from Computer World in Holland and is one of a range of Vic peripherals from that company. It is a single board which plugs into the Vic's expansion port and contains two decoders — one for RTTY and the other for morse code, with both having facilities for transmitting and receiving. Its advertised cost of £89 doesn't take into account post and packing, import costs or the extra hardware required to operate it.

There are two very distinct sections on the circuit board. The first is the ROM containing the necessary software, the second is the

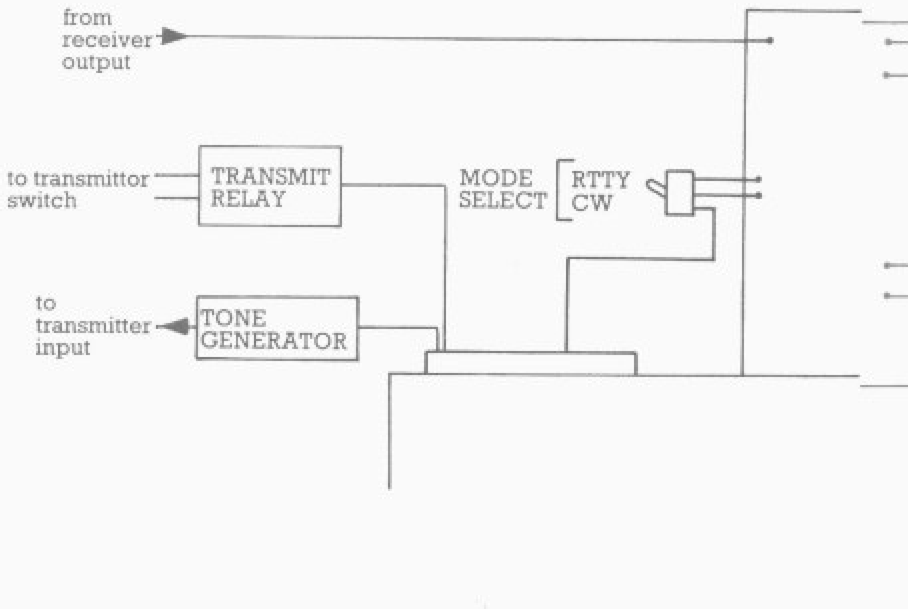


Figure 6: Connections to TDK-20

two tone detectors — the two sections are not connected together in any way and signals are fed to the Vic through the user port, for which the connector is not provided.

One thing that the ads don't tell you is that you'll need to add an external power supply for the tone detectors (a 6-0-6 volt mains transformer) and a connection to the user port. **Figure 6** shows the necessary additional connections to get full use of the unit.

It is set up for two different *space* frequencies (1.275kHz and 2.125kHz) and two different shift frequencies (170Hz and 425Hz). But these can be changed, and instructions for doing this are provided.

Getting started
SYS43000 starts the system running. This presents the name, address and call sign of the registered user; and from here, pressing the appropriate function key will access the RTTY or morse code facilities.

Tuning in to the signal can be fairly critical, but two LEDs are provided to indicate that a *mark* or *space* tone is being received. These are positioned on the interface board. I found that rather inconvenient and would have liked to have seen some indication on the screen that those tones were being received.

Assuming that you've successfully tuned into a suitable RTTY signal you should immediately see the text begin to appear on the screen.

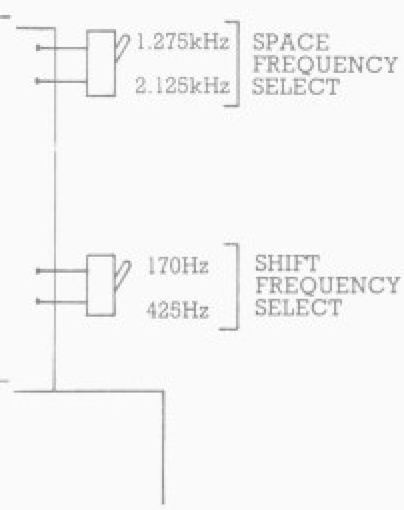
Baud rates of 45.5, 50, 57, 75, 110, 150, 200 and 300 are available. Baud rate selection is done using the shifted plus and minus symbol keys, with the current baud rate always being shown on the screen.

Although the baud rate can be altered from the keyboard, the *space* and shift frequencies can only be altered by changing connections (or switches if you've installed them) on the interface unit.

As soon as you press any key on the keyboard, the unit goes into transmit mode which — with some additional hardware — will turn the transmitter on. If you don't type anything for three seconds, the unit will revert to 'receive' mode.

In the early days of RTTY it was possible to prepare punched tapes of the most frequently-used messages, such as a CQ call (a general call inviting other amateurs to reply), test sequences and so on. With the TDK-20 several useful sequences are built in and these include the owner's call sign which is put into the EPROM when you order the unit. You can also store your own messages in one of the three available buffers, and subsequently transmit them simply by pressing the F1, F2 or F3 keys.

As well as sending and receiving RTTY signals, the TDK-20 also sends and receives morse code — known as CW. This it does *fairly* well, although it doesn't seem to cope with variations in sending speed as well as it might. It even provides an audio output to the TV set when sending, which could be a useful aid in learning morse code. ▶



Ham Radio

TAL RTTY Module

This unit is very different to the Dutch offering. It is totally self-contained and requires only a minimum of connections (as shown in **Figure 7**) — it even has the necessary relay included for turning the transmitter on and off.

It too has the tone detectors on board, but it uses a UART chip in the module to do the conversion of the serial data to a parallel byte. This normally operates at 45.5 baud, but keyboard selection of other baud rates up to 150 baud is available by throwing a switch on the interface board.

The frequency shift is generally set to the normal amateur shift of 170Hz, with provision on the module for altering this if required: there are two LEDs on the board to indicate reception of *mark* or *space* tones. Again, I would have liked to have seen this indication on the screen.

The TAL unit seemed to cope better with errors in reception and wouldn't print garbage on the screen without your knowing that there'd been problems. There's even the facility to force the decoding mode to letters or figures in the event of the appropriate shift character being missed.

The other facilities provided are very similar to the Dutch unit, although they're more thoughtfully designed. Four or five user-programmable messages are provided as well as a range of pre-programmed messages, and the call sign is embedded in the EPROM.

The text is semi-formatted on the screen to reduce the possibility of words being cut in half as the wrapped around the screen line, and the overall display is reasonably well constructed bearing in mind the limitations of the Vic screen.

Extras

Since I first tried this unit, some significant features have been added. The first is the ability to print text simultaneously to the Vic printer as it is being received. At first sight this may not seem so revolutionary: but the way the Vic handles the printer means that printing while processing fast, real-time input is extremely difficult. The provision of this is possible only because the Vic is not being used to do the serial-to-parallel conversion, relying instead on the UART chip; it works well on speeds up to about 100 baud.

The second enhancement is the ability to recognise the owner's call sign in a special format: and, when this is received, to print the received message. This means that if the unit is left monitoring a specific frequency any messages ▶

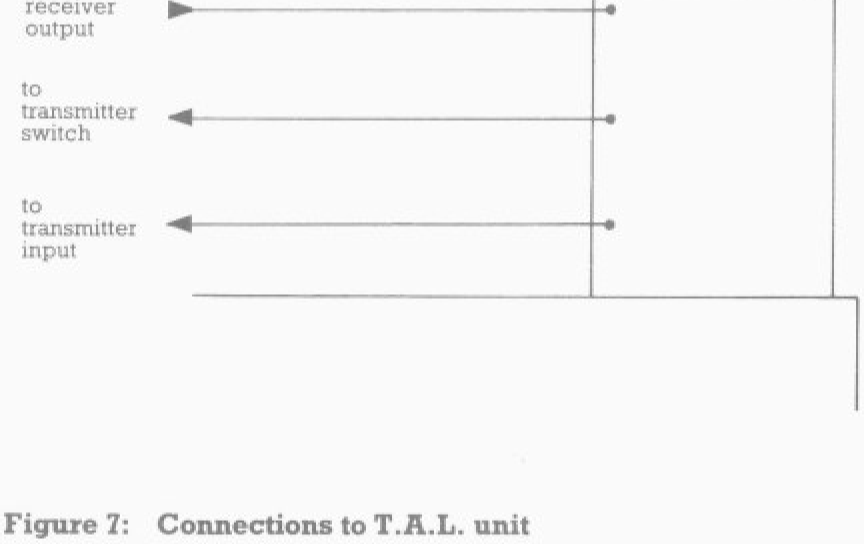
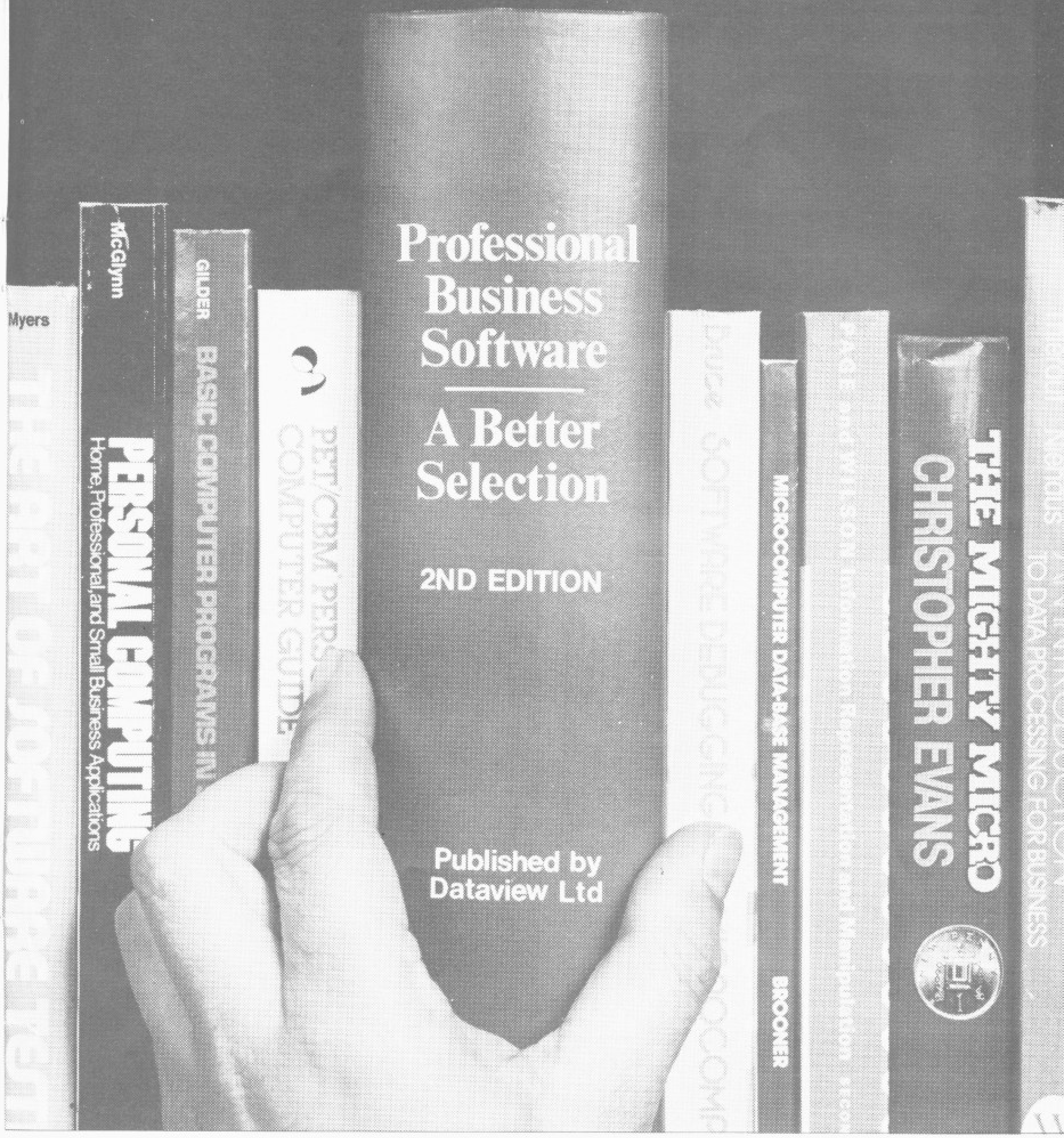


Figure 7: Connections to T.A.L. unit

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The design of the Programs are fully "User Friendly" and have numerous "Error" messages that notify the operator if the code conditions are not being met. Upon entering the "Help" message, this will outline the solution to help you.

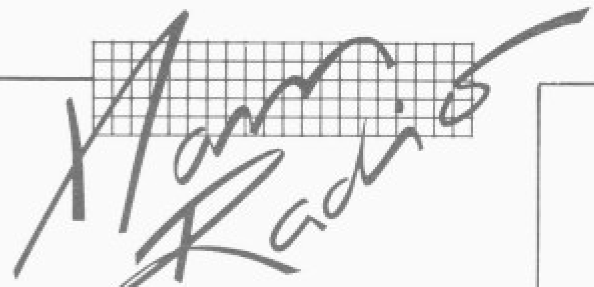
KEY POINTS: ● They are easy to use ● They are self-contained ● They are both inexpensive (Bureaux and Mainframes are much more costly) ● They produce clear reports for second and third parties ● Both systems are portable ● Both packages are designed by engineers for engineers.

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▷directed towards the owner's call sign will be printed out. They don't even have to have been sent by a similar unit, they only have to conform to the necessary format (which is basically a standard message-switching format).

The units are hand-made to order: and this leads me to my main criticism. Mine was not very well constructed; it is very difficult to get at the circuitry, and once inside some chips have had their numbers scratched off — which makes servicing or modification almost impossible. □

Summary

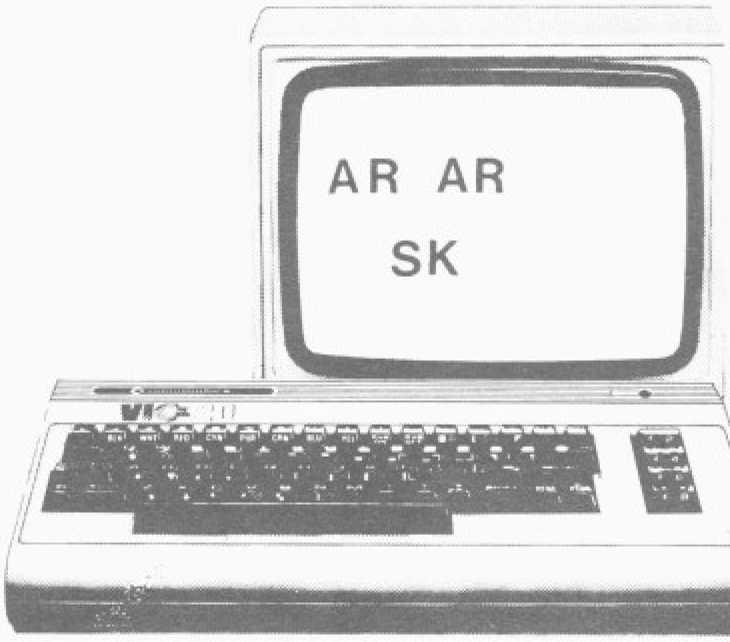
Neither unit performed particularly well in the presence of the large amount of FRI (radio frequency interference) that the Vic produces — although it is possible to improve matters with a good aerial, careful cabling and significant shielding of the Vic and TV. Fed with a good strong signal, there was little to choose between the two units in terms of performance . . . though the TAL unit does provide some for of error indication on the screen.

It was also very much quicker, easier and cheaper to install and operate. The mass of additional hardware needed to get the Dutch TDK-20 running made a horrid mess and would really need to be put into a box, all of which will increase the cost.

If you want to send and receive morse code, the only choice *is* the Dutch unit. But by the time you've added tone generators and transmitter relay, the added cost of hardware and time (not to mention important costs) make it much more expensive than its advertised cost of £89 plus £5 post and packing would imply. You can see this unit in the Computer World ad in *Vic Computing;* the address is 99 Hilvertsweg, 1214JB Hilversum, Holland.

In terms of RTTY, I found the TAL unit slightly better to work with and with its new features I would consider it the better buy at £99.95. It's available from TAL Computer Division, 11 High Street, Leighton Buzzard, Bedfordshire.

There's a special group formed which is affiliated to the Radio Society of Great Britain called the British Amateur Radio Teleprinter Group (BARTG). If you want to know any more about RTTY, drop a line to its secretary Mr. E. Batts, 27 Cranmer Court, Kingston, Surrey — enclose an SAE. □



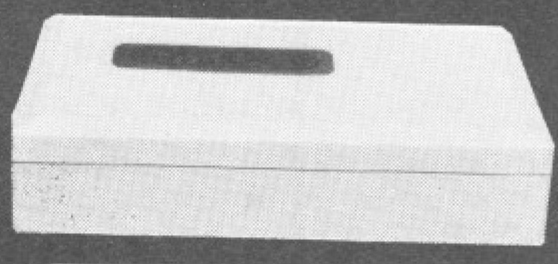
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Programmers Aids

Four contenders reviewed

by Mike Todd

The basic Vic is a useful little machine with enough built-in facilities for programs of reasonable complexity to be written after only a few days at the keyboard.

But as it stands it's not perfect — you might want *more* facilities. Increasing its capabilities is often a matter of adding extra memory. Whichever way you do it, programs can become more adventurous: and you can start to make more use of the graphics and sound capabilities of the Vic than was previously possible.



But to do this does require those intimidating PEEKs and POKEs, both to set up the high-resolution graphics and for the tediously slow maths involved in plotting points, lines and curves. Programming can eventually become someting like wading through treacle.

Both Commodore and Stack have produced extensions to the Basic language to make programming these features very much easier — these are the Commodore Super Expander cartridge (which also comes with 3K of RAM) and the Stack Vickit III chip, both of which I'll be looking at later. They add extra commands for use within programs and that does make the programming much easier. But those programs must subsequently be run on a machine which has the extension installed.

On the other hand there are programming *Aids*. These differ from extensions to Basic in that they are designed for use only *during* programming and are not required for actually *running* the program. In fact, no-one looking at the finished program would know that these aids had been used.

We found four add-on programmer's aids for the Vic — from Commodore, Stack, DAMS and Audiogenic. Mike Todd put them through their paces.

All four Aids have very similar commands for the user. There are however some significant differences in the way that these are implemented, and they're not necessarily all available on all four. These commands are listed in the table.

AUTO: Automatically provides line numbers when typing in programs, thus saving a little extra work. The starting line number and the increment can both be defined by you.

DELETE: Allows a range of lines to be deleted from a program.

DUMP: Prints out all variables currently in use, together with their values. Not on VICAID; and all but BUTI ignore arrays completely.

FIND: Searches through the program in memory and lists all lines which contain a specified sequence of characters.

KILL: Disconects the Aid if it is interfering with any aspects of the Vic. (VICKIT requires a SYS command to perform the same function.)

MERGE/APPEND: Allows programs on disk or tape to be included in a program already in memory. APPEND simply tacks the new program on to the end of the program in memory, taking no account of line numbers. If the new code has lines with the same numbers as the original program, they'll overwrite the existing ones. MERGE actually treats the lines of the new program as if they had been typed at the keyboard and puts them in their correct place.

CHANGE/EDIT: Like FIND, will locate all occurrences of the specified character sequence; but then will change each occurrence to another set of specified characters.

HELP: When the program stops as a result of an error message, typing HELP will provide some indication of where the error is by highlighting the part of the statement where the error occurred. The HELP command on BUTI does something totally different, though.

RENUMBER: This allows entire programs (optionally on VICKIT and BUTI, a *section* of a program) to be renumbered; you specify the new starting line number and the line increment. It automatically takes care of any GOTOs, GOSUBs or ON.. GOTO/ GOSUB constructions: and provision is made for references to non-existent lines to be given a line number of 63999 or 0 to enable them to be identified easily. (Beware — all four Aids allowed programs to be renumbered with a line increment of zero — which results in a program having all line numbers the same! It's not possible to recover from this condition and the program has, to all intents and purposes, been lost.)

TRACE/STEP: Both TRACE and STEP allow the progress of a program to be watched — the line numbers appear in a box at the top right of the screen as they are executed. TRACE normally runs very quickly but can be slowed down by pressing a key. STEP stops at the end of each statement and waits for a key to be pressed before executing the next one.

OFF: In all cases, OFF is used to turn the TRACE or STEP facility off. ▶



VICAID

This is a ROM chip at £22.95. It requires a ROM socket to be available: and DAMS makes a suitable 'RAM'n'ROM' board for £26.40 which also contains 3K RAM plus an additional socket suitable for its machine-code monitor ROM.

VICAID is normally supplied to occupy memory addresses from 40960 to 45055 ($A000-$AFFF) and is automatically activated when the Vic is switched on.

In those locations it clashes with many games cartridges. VICAID is also available in a version that takes 24576-28671 ($6000-$6FFF) where it cannot be used if more than 16K RAM expansion is installed, or at 45056-49151 ($B000-$BFFF) where it will clash with the larger (8K) games cartridges — these two require SYS commands to activate them.

VICAID doesn't have the DUMP command, nor any special extra features. But it does have a (very simple) machine-code monitor (access by typing BREAK) and the ability to read the position of a light pen on the screen. My feeling though is that an Aid package is not the place for such a facility.

There is also a problem with its RENUMBER command if line numbers beyond 63999 are produced. The other three Aids generate an error message in this case; VICAID continues to renumber, with the resulting line numbers "wrapping around" to start again at 0. The result is a corrupted program, needless to say.

If VICAID is disabled using KILL, it is possible to enable it again simply by press RUN/STOP and RESTORE together.

VICKIT I

Again, Stack's Aid is a single ROM chip (£28.75); but this one requires a SYS command to activate it. It needs an expansion board with a ROM socket available — Stack produces several different boards which would be suitable, all of which will up the price considerably.

Stack also has its Supercharger Plus for £51.75; that includes 3K RAM and the extended VICKIT III.

VICKIT occupies RAM locations 45056-49151 ($B000-$BFFF), which will conflict with any 8K games cartridges installed.

Of all the Aids tested, VICKIT is the least versatile and therefore least useful. It doesn't have the CHANGE command; and additional features are limited to the LIST command which lists lines one at a time each time the space bar is pressed. I found this feature very irritating and wished it could be disabled if not required, especially since the CTRL key can already be used to slow down a listing.

VICKIT also had some odd quirks — for instance, if you typed HELP after an error at the end of a statement no characters would be highlighted. It also has a dangerous feature in DELETE where, if only a single line number is specified (e.g. DELETE 10), the *whole* program from line 10 to the end is deleted! The entire program could also be erased by RENUMBER under certain circumstances.

Programmer's Aid

This is a standard Commodore cartridge which plugs straight into the Vic and is activated by a SYS command. It costs £34.95, and is fully self-contained.

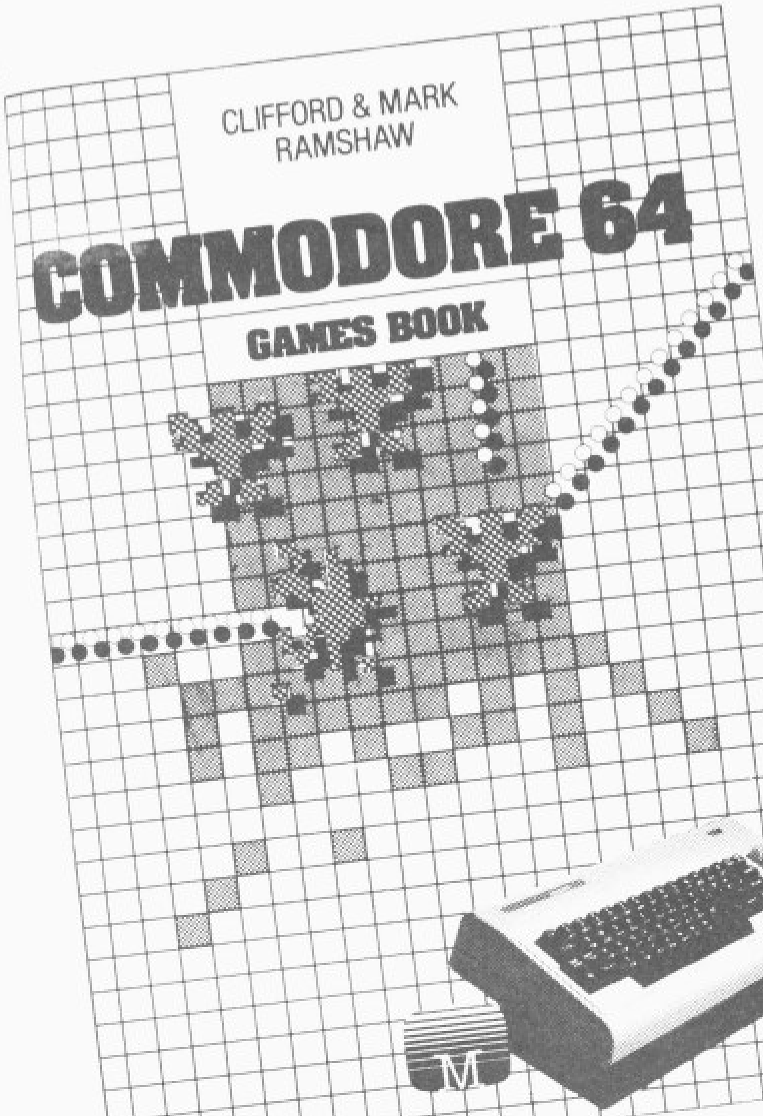
It occupies memory locations 28672-32767 ($7000-$7FFF in hex) and so cannot be used if there is already RAM at these locations; that would be the case if more than 16K of RAM expansion has been installed.

The Programmer's Aid has two sets of 12 useful character sequences 'embedded' in the function keys. The first of them (used while editing a program) provides single-key entry of such sequences as "LIST", "AUTO", "TRACE" and so on: and for programming there are several ready-to-use Basic keywords available such as "MID$(", "INPUT" and "RETURN".

Using the KEY command, the programmer can obtain a list of what each function key will produce: and you can also define your own key functions.

MERGE allows frequently-used subroutines (which have been SAVEd in the normal way) to be merged into an existing program in memory. This facility doesn't just append the new program on to the end of the old, but actually interleaves program lines as necessary — just as if they'd been typed at the keyboard.

Six control key sequences are also provided (press CTRL and the key together) which will clear the screen from the cursor, or just to the end of the current line, or the whole of the current line. They also allow the annoying quotes mode to be aborted and to LIST a program forwards and backwards — in other words you can use the screen as a window into the program and move it up or down to see the section you want.



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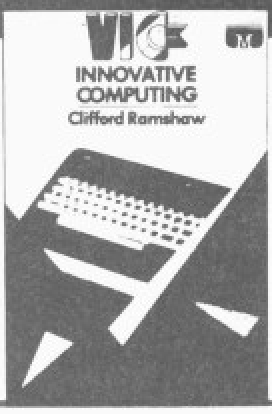
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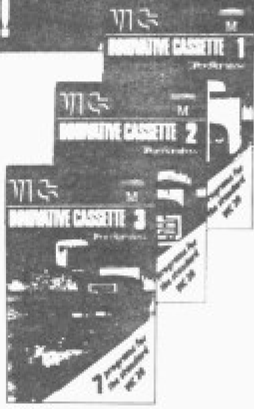
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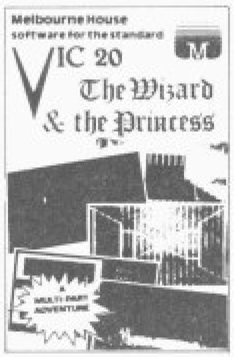


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Buti Plus

Audiogenic's BUTI (pronounced 'beauty') comes with 3K of RAM and a machine code monitor built in. It occupies 40960-49151 ($A000- $BFFF) and is automatically activated on switching on: the machine code monitor is at 24576-32767 ($6000-$7FFF)

Although there's only 8K of ROM on board, inadequate address decoding results in this occupying 16K of memory space. It can't be used with more than 16K of RAM expansion.

Although there are nowhere near as many commands available as on the Commodore cartridge, they are all well thought out and contain good error-checking.

There are a couple of extra commands available too. As well as a decimal/hex/binary converter, and a facility to recover a program which has just been NEWed, there is a VIC command which allows reconfiguration of an expanded Vic. For instance, VIC on its own will reconfigure the Vic as though it had no memory expansion at all.

The error indication facility, provided using HELP on the other Aids, happens automatically. Whenever a program error stops the program, the line in which the error occurred is listed with the position of the error highlighted. □

Performance Ratings

Product	VICKIT I	Programmer's Aid	VICAID	BUTI-Plus
Supplier	Stack	Commodore	DAMS	Audiogenic
Price	£28.75	£34.95	£22.95	£39.95
Supplied as	ROM	cartridge	ROM	cartridge
Located at	$B000	$7000	$A000 or $B000 or $6000	$A000
Initialise with	SYS 45056	SYS 28681	automatic; or SYS 45056 or 24576	automatic
KILL	** (use SYS 58459)	*** (leaves function keys defined)	**** (use RESTORE Key to re-activate)	***
AUTO	***	****	**	*****
DELETE	**	****	****	****
DUMP	***	***	no	****
FIND	**	****	***	****
CHANGE/EDIT	no	****	***	***
HELP	**	***	**	***
RENUMBER	****	***	**	****
TRACE	****	****	****	****
STEP	**	**	****	****
OFF	****	****	****	**
LIST	**	*****		****
	one line at a time	two-way scrolling	normal	normal
KEY	no	*****	no	no
CLEAR	****	****	no	no
ESCAPE QUOTES MODE	no	****	no	no
MERGE/APPEND	no	****	no	**
In-built machine code monitor	no	no	**	****
LIGHTPLOT and LIGHTREAD	no	no	**	no
UNNEW	no	no	no	**
Vic reconfigure	no	no	no	****
DEC-HEX/HEX-DEC	no	no	no	****
Total points	34	60	36	56
Value for money	1.18	1.72	1.57	1.40

The asterisks in the table indicate the relative usefulness and reliability of the features covered. The total number of asterisks given at the bottom summarises our overall view; the 'value for money' line is basically an 'asterisks per pound' indicator, so the higher the result the better.





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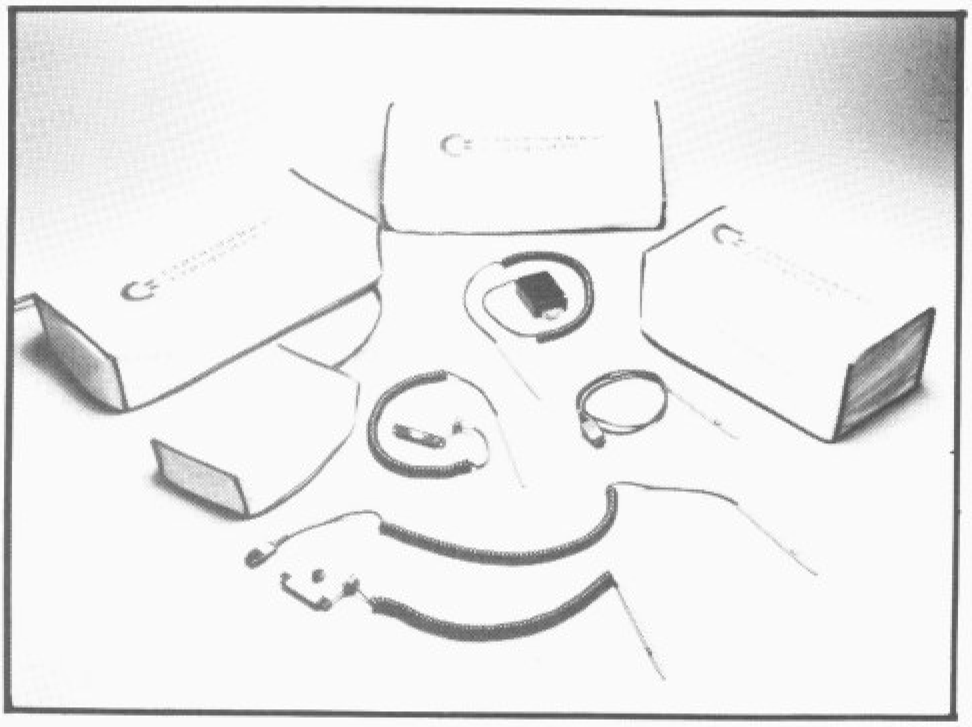
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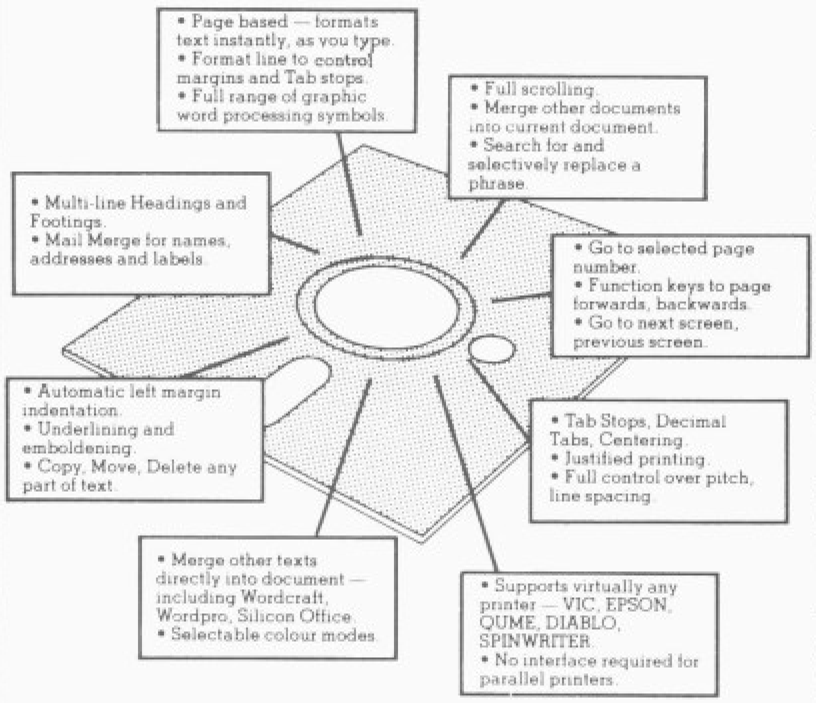
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Super SID!

Inside the 64's sound synthesiser

by Kent Multer

Commodore's model 6581 Sound Interface Device (SID) in the 64 is truly impressive: an entire music synthesizer on a single chip. In this article Kent Multer describes SID's features and gives you some ideas on how it can be used.

Figure 1 shows a block diagram of the SID chip. As you can see it has three voices (meaning it can produce three notes at once).

Each voice consists of a *tone generator,* which produces the sound, and an *envelope generator,* which controls the volume. There are also some *modulation effects,* in which two tone generators combine to produce one complex sound.

The signals from the voices may be routed through a *filter,* which acts like a super tone control. This is the thing that makes SID so powerful and so much more versatile than the sound generators on other home computers.

Other features of SID include *master volume control* and an *external audio input* that allows you to run a signal from your electric guitar or other source through SID's filter.

There are also two *A/D converters* on the chip, intended for connecting to potentiometers. These are not electrically connected to anything else in SID, so you can use them for game controllers or whatever.

SID's functions are controlled by a number of eight-bit registers. In Commodore's machines the chip is mapped into the memory address space so you can write data into the registers with POKE statements. Each voice has seven registers for controlling its specific functions, and there are eight more registers for controlling the filter, master volume, etc. **Figure 2** illustrates the control registers.

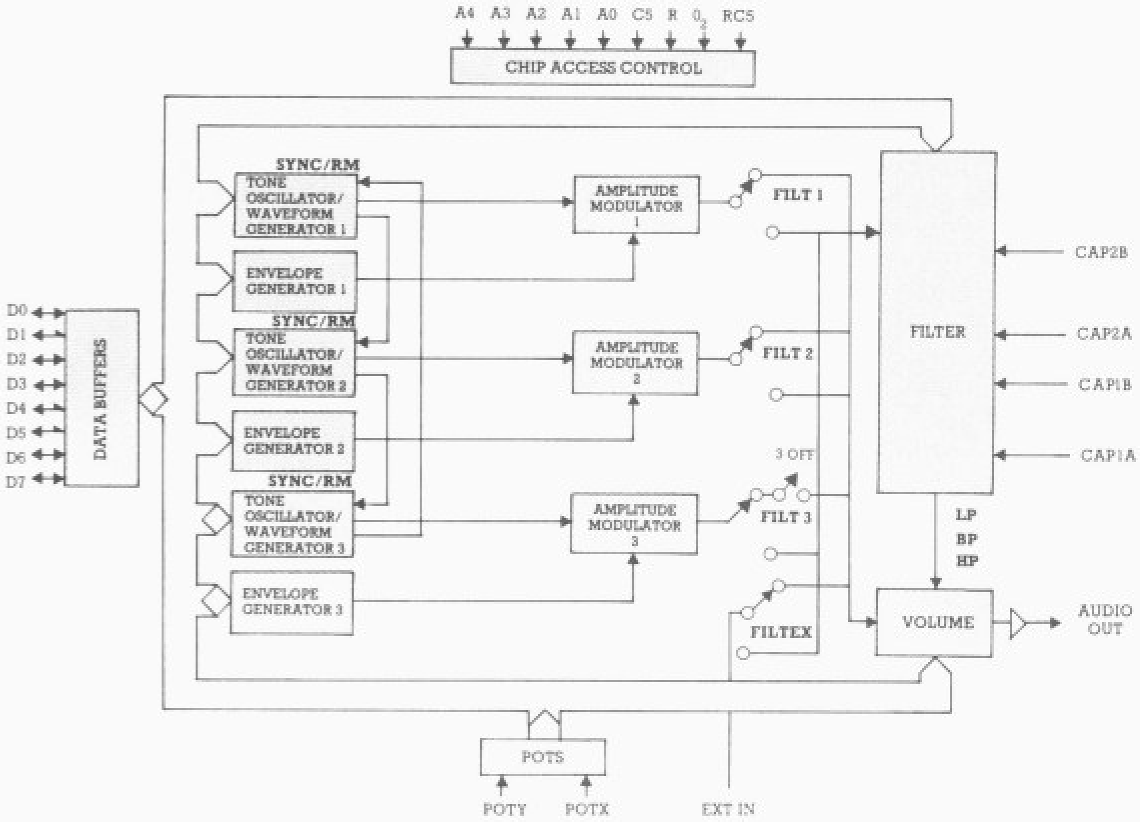


Figure 1: Block diagram of the SID

Tone generators

SID has three tone generators, each of which can generate four different waveforms: sawtooth, triangle, pulse, and noise.

Sawtooth waves contain lots of harmonics, and are good for rich sounds like horns or strings. **Triangle** waves only have a little bit of harmonic energy, so they have a very mellow, flute-like sound.

Pulse waves can have a lot of different sounds, depending on the pulse width, which you can vary. When the pulse width is at or near 50 per cent, you get a square wave which is sort of hollow

	Address	D7	D6	D5	D4	D3	D2	D1	D0	Register name
VOICE 1	54272	F_7	F_6	F_5	F_4	F_3	F_2	F_1	F_0	FREQ LO
	54273	F_{15}	F_{14}	F_{13}	F_{12}	F_{11}	F_{10}	F_9	F_8	FREQ HI
	54274	PW_7	PW_6	PW_5	PW_4	PW_3	PW_2	PW_1	PW_0	PW LO
	54275	—	—	—	—	PW_{11}	PW_{10}	PW_9	PW_8	PW HE
	54276	NOISE				TEST	RING MOD	SYNC	GATE	CONTROL REG
	54277	ATK_3	ATK_2	ATK_1	ATK_0	DCY_3	DCY_2	DCY_1	DCY_0	ATTACK/DECAY
	54278	STN_3	STN_2	STN_1	STN_0	RLS_3	RLS_2	RLS_1	RLS_0	SUSTAIN/RELEASE
VOICE 2	54279	F_7	F_6	F_5	F_4	F_3	F_2	F_1	F_0	FREQ LO
	54280	F_{15}	F_{14}	F_{13}	F_{12}	F_{11}	F_{10}	F_9	F_8	FREQ HI
	54281	PW_7	PW_6	PW_5	PW_4	PW_3	PW_2	PW_1	PW_0	PW LO
	54282	—	—	—	—	PW_{11}	PW_{10}	PW_9	PW_8	PW HI
	54283	NOISE				TEST	RING MOD	SYNC	GATE	CONTROL REG
	54284	ATK_3	ATK_2	ATK_1	ATK_0	DCY_3	DCY_2	DCY_1	DCY_0	ATTACK/DECAY
	54285	STN_3	STN_2	STN_1	STN_0	RLS_3	RLS_2	RLS_1	RLS_0	SUSTAIN/RELEASE
VOICE 3	54286	F_7	F_6	F_5	F_4	F_3	F_2	F_1	F_0	FREQ LO
	54287	F_{15}	F_{14}	F_{13}	F_{12}	F_{11}	F_{10}	F_9	F_8	FREQ HI
	54288	PW_7	PW_6	PW_5	PW_4	PW_3	PW_2	PW_1	PW_0	PW LO
	54289	—	—	—	—	PW_{11}	PW_{10}	PW_9	PW_8	PW HI
	54290	NOISE				TEST	RING MOD	SYNC	GATE	CONTROL REG
	54291	ATK_3	ATK_2	ATK_1	ATK_0	DCY_3	DCY_2	DCY_1	DCY_0	ATTACK/DECAY
	54292	STN_3	STN_2	STN_1	STN_0	RLS_3	RLS_2	RLS_1	RLS_0	SUSTAIN/RELEASE
FILTER	54293	—	—	—	—	—	FC_2	FC_1	FC_0	FC LO
	54294	FC_{10}	FC_9	FC_8	FC_7	FC_6	FC_5	FC_4	FC_3	FC HI
	54295	RES_3	RES_2	RES_1	RES_0	FILT EX	FILT 3	FILT 2	FILT 1	RES/FILT
	54296	3OF	HP	BP	LP	VOL_3	VOL_2	VOL_1	VOL_0	MOD/VOL
MISC	54297	PX_7	PX_6	PX_5	PX_4	PX_3	PX_2	PX_1	PX_0	POTX
	54298	PY_7	PY_6	PY_5	PY_4	PY_3	PY_2	PY_1	PY_0	POTY
	54299	O_7	O_6	O_5	O_4	O_3	O_2	O_1	O_0	OSC3/RANDOM
	54030	E_7	E_6	E_5	E_4	E_3	E_2	E_1	E_0	ENV3

Fig 2: SID control registers

Table 1: Music note values for SID

This contains a complete list of note numbers, actual notes, and the values to be POKEd into the HI FREQ and LOW FREQ registers of the sound chip to produce the indicated note.

Note no.	Note — Octave	HI FREQ	LOW FREQ
0	C-0	1	18
1	C#-0	1	35
2	D-0	1	52
3	D#-0	1	70
4	E-0	1	90
5	F-0	1	110
6	F#-0	1	132
7	G-0	1	155
8	G#-0	1	179
9	A-0	1	205
10	A#-0	1	233
11	B-0	2	6
12	C-1	2	37
13	C#-1	2	69
14	D-1	2	104
15	D#-1	2	140
16	E-1	2	179
17	F-1	2	220
18	F#-1	3	8
19	G-1	3	54
20	G#-1	3	103
21	A-1	3	155
22	A#-1	3	210
23	B-1	4	12
24	C-2	4	73
25	C#-2	4	139
26	D-2	4	208
27	D#-2	5	25
28	E-2	5	103
29	F-2	5	185
30	F#-2	6	16
31	G-2	6	108
32	G#-2	6	206
33	A-2	7	53
34	A#-2	7	163
35	B-2	8	23
36	C-3	8	147
37	C#-3	9	21
38	D-3	9	159
39	D#-3	10	60
40	E-3	10	205
41	F-3	11	114
42	F#-3	12	32
43	G-3	12	216
44	G#-3	13	156
45	A-3	14	107
46	A#-3	15	70

Note no.	Note — Octave	HI FREQ	LOW FREQ
47	B-3	16	47
48	C-4	17	37
49	C#-4	18	42
50	D-4	19	63
51	D#-4	20	100
52	E-4	21	154
53	F-4	22	227
54	F#-4	24	63
55	G-4	25	177
56	G#-4	27	56
57	A-4	28	214
58	A#-4	30	141
59	B-4	32	94
60	C-5	34	75
61	C#-5	36	85
62	D-5	38	126
63	D#-5	40	200
64	E-5	43	52
65	F-5	45	198
66	F#-5	48	127
67	G-5*	51	97
68	G#-5	54	111
69	A-5	57	172
70	A#-5	61	126
71	B-5	64	188
72	C-6	68	149
73	C#-6	72	169
74	D-5	76	252
75	D#-6	81	161
76	E-6	86	105
77	F-6	91	140
78	F#-6	96	254
79	G-6	102	194
80	G#-6	108	223
81	A-6	115	88
82	A#-6	122	52
83	B-6	129	120
84	C-7	137	43
85	C#-7	145	83
86	D-7	163	31
88	E-7	172	210
89	F-7	183	25
90	F#-7	193	252
91	G-7	205	133
92	G#-7	217	189
93	A-7	230	176
94	A#-7	244	103

or clarinet-like. When the pulse width is close to zero (or to 100 per cent — they both sound the same to the ear), the tone is very thin, more like an oboe. In between is an impressive variety of sounds, including saxophones and sometimes human voices (if you set the filter right).

The **noise** waveform has no precise pitch; it's used for untuned sounds like percussion, wind, or jet engines. With this waveform, low notes come out as a deep rumble and high notes sound like a snake's hiss.

The frequency of each tone generator is set by a 16-bit number that you POKE into two control registers (high and low bytes). The output frequency in Hertz is equal to the number in the registers multiplied by 0.0596.

Table 1 gives the numbers that you use for the notes of the musical scale. SID has a range of eight octaves; is that enough for you? It ought to be; it's more than almost any conventional instrument can play.

With 16-bit frequency control, there are a lot of pitches in between the notes of the scale. You can generate glissando or portamento effects by rapidly incrementing or decrementing the number in these registers, so that the sound makes a smooth sweep from one pitch to another. You can also set two or three tone generators to be just a tiny bit out of tune with each other, which gives a rich, chorus-like quality to the sound.

Actually, SID's range is more than eight octaves: it can be tuned so low that you can't hear it, down to about one cycle every 16 seconds! We'll look at uses for the sub-audio range a little later.

Control registers

Each voice has a control register that contains one bit for each of the four waveforms. If you turn on more than one of these bits, the resulting sound will be a logical ANDing of the selected waveforms. This could give you some interesting effects, but usually you will only use one waveform at a time.

A word of warning: combining the noise waveform with any others may 'lock it up', cancelling the noise output until you reset it with the Test bit or the chip Reset line.

When you select the pulse wave, the pulse width is set by a 12-bit number which occupies two control registers. You can sweep the pulse width smoothly from one value to another, which gives a very nice soaring or 'phase shifting' sound.

The control register contains bits for *ring modulation* and *synchronization* functions. These two effects are similar: they both take input from two tone generators and produce an output that has some components of the inputs plus some other frequencies that aren't present in either input.

This can produce metallic sounds such as chimes and gongs. If you vary the frequency of one of the inputs while listening to the signal, you get a great science fiction-type sound in which you can hear some pitches rising, while others are falling at the same time. Note that the ring-mod function only affects the triangle wave output, but the synch function applies to all waveforms.

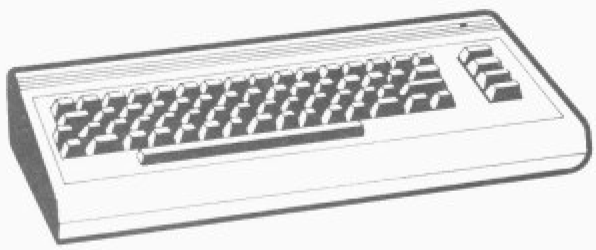
The difference between the two effects is something that

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I can't really describe in words, so I suggest you just try it. For some wild sounds, you can use both effects and once. For example you can set voice 2 to be in synch with voice 1, and set voice 3 to be ring-modulated by voice 2. I once did something like that with an ARP 2600 synthesizer and got a really nice simulation of someone banging on a garbage can.

Each voice has a Test bit: when set to 1 this turns off all waveforms and resets the internal counters to zero. Commodore's spec sheets suggest that this feature may have some musical applications, but do not give any specific uses.

I do have a couple of ideas, though: if you want to create a complex sound by combining two or three voices, you can use the Test bit to make sure that all the tone generators start their waveforms at the same moment; otherwise the slight delay might produce random variations in the sound. Also, the Test bit can be used to turn a voice on and off instantly, whereas using the envelope generator takes at least a few milliseconds.

Envelope generators

This is another important synthesizer function. The term 'envelope' refers to the way in which the volume changes during the playing of a note.

Each note is divided into four phases called *attack, decay, sustain,* and *release.* In the **attack** phase, the volume rises from zero to a maximum or peak value. Then, during the **decay,** the volume falls off to some intermediate level. Next comes the **sustain**, in which the volume remains constant for as long as you want to hold the note. Finally, during the **release** the volume falls back to zero.

The attack, decay, and release times, as well as the difference between the peak and sustain volume, are important factors in making one instrument sound different from

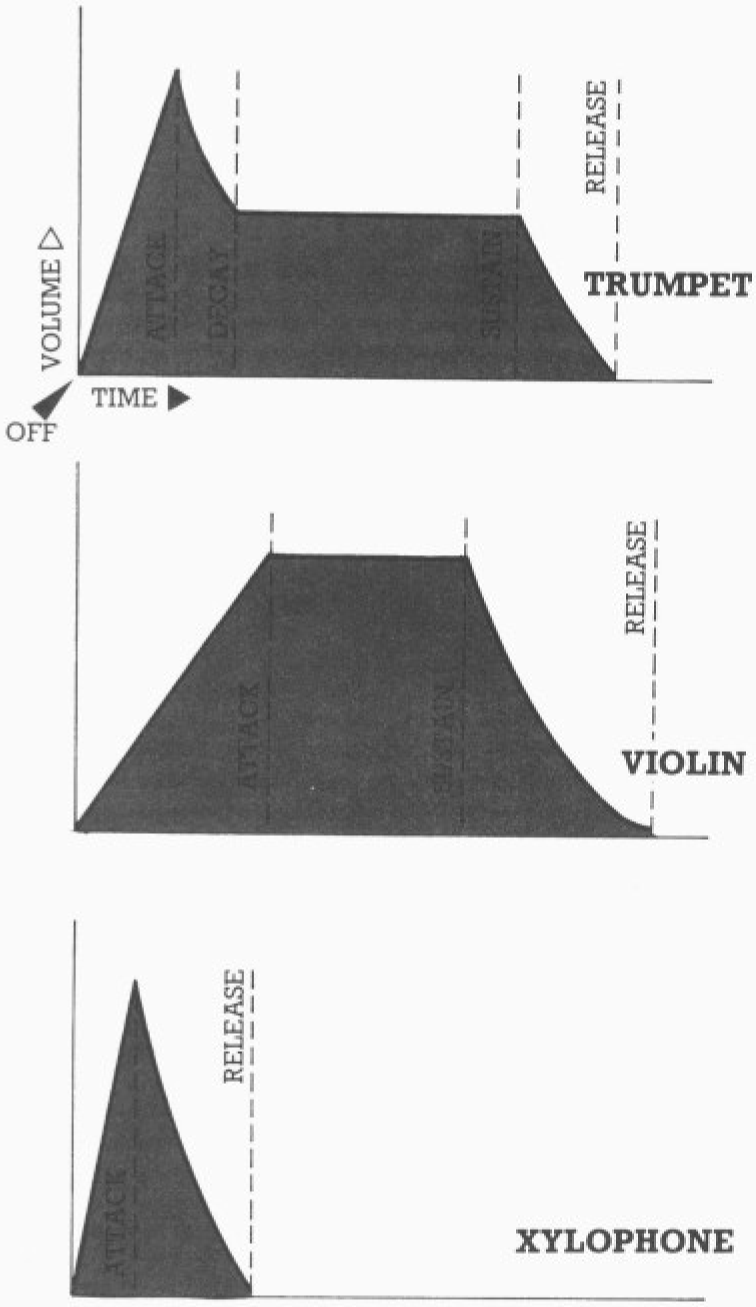


Fig 3: Typical Sound envelopes

another. For instance, as **Figure 3** shows, a trumpet has a very short attack and decay time, giving a quick snap of loud sound at the beginning of each note. Then the volume remains constant as long as the musician keeps belowing, and when he or she stops, the note takes a tenth of a second or so to die out (release).

Compare this to the violin envelope, which has a slow attack and no pronounced peak. The xylophone, by contrast, has a very fast attack but no sustain at all; the note always dies away quickly.

Each voice in SID has its own controls for attack, decay, sustain and release. Each of these parameters is controlled by a four-bit number that can select one of sixteen possible values. The attack and decay are set by one control register, and the sustain and release by another.

Attack times range from two milliseconds to eight seconds. The decay and release times range from 6 milliseconds to 24 seconds. The sustain is not a time; it's a volume. If it is set to maximum (15), the volume will remain at the peak level, like the violin envelope in Figure 3.

The envelope generator is activated by a bit in the voice's control register called the Gate. (This is a synthesizer term, not really related to the logic gates computer buffs are used to.) Setting the Gate to 1 starts a note; it causes the envelope generator to do its attack-decay-sustain phases. When the Gate is set to 9, the note begins its release phase.

Note that the attack has a linear slope, but the decay and release have an exponential curve. This is a nice touch; it corresponds to the way that strings, horns and other vibrating objects generally behave. Most synthesizers do either linear or exponential slopes — but not both.

Filter section

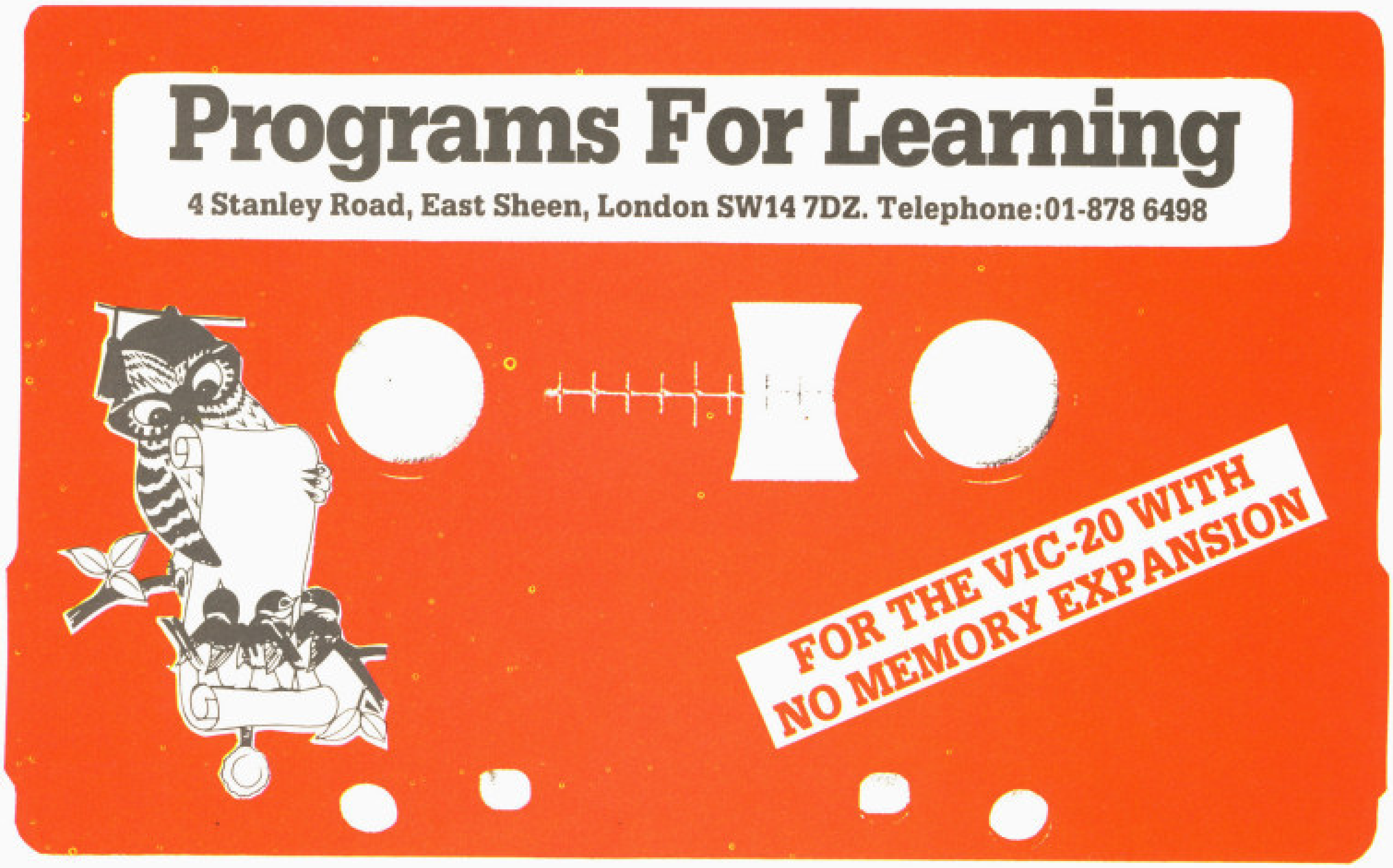
The filter, in a sense, is the heart of a synthesizer. Granted, it doesn't actually produce sound: it just modifies what the tone generators produce. But you will find that the filter has more control than anything else over what you hear. I'd rather have one waveform and a filter than a whole lot of waveforms and no filter.

The filter's function is similar to the tone controls on a hi-fi, in that it allows you to emphasize or remove certain parts of the audio spectrum. The range of possible effects is shown graphically in **Figure 4.**

SID's filter has three outputs. The **low-pass** output, as its name implies, will pass all signals below a certain frequency, called the cutoff frequency. Everything above the cutoff is 'rolled off' (reduced in volume) at a rate of 12 dB per octave; the higher the frequency, the more it is reduced.

Similarly, the **high-pass** output passes signals above the cutoff, and rolls off everything below it. The **band-pass** output rolls of frequencies above or below, and passes only those signals that are fairly close to the cutoff frequency.

Each of the filter's outputs is controlled by a single bit in one of SID's registers. So by setting several bits to 1 you can mix the outputs. Mixing the high-pass and low-pass outputs gives what is called a **notch filter.** This is the opposite of the band-pass: it rejects frequencies near the cutoff, and passes everything else.



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The cutoff frequency is selected by an 11-but number that you poke into two control registers. With the recommended 2200pf capacitors, the cutoff frequency can range from 30Hz to 10kHz.

The filter also has a resonance or 'Q' control. This determines how strong the effect is. With low resonance, the sound is not too different from your hi-fi's tone controls.

With high resonance, you get a very intense effect, like different vowel sounds of the human voice. A rock guitarist's wah-wah pedal is just a band-pass filter with a very high resonance. It goes 'wah' when the musician raises the cutoff frequency by pushing down on the pedal, and it goes 'yow' when he or she lowers the cutoff by moving the pedal the other way. You can produce the same effect with SID by selecting a high resonance and then varying the cutoff while a not is playing.

Most synthesizers provide an envelope generator that controls the filter cutoff, allowing it to automatically rise and fall every time a note is played. SID does not have this feature, but you can write a program to do it.

Some of the more expensive synthesizers can also change the resonance in the same manner. The effect is more subtle, but useful to the advanced synthesist. With SID, once again, you can do this under program control; isn't software wonderful?

Each of the three voices can be routed through the filter, or it can be sent directly to the main output. This feature helps make up for the fact that there are three voices but only one filter. You can filter one voice, and use pulse width changes to produce filter-type effects on the other two.

Other features

As I mentioned earlier, SID has an external input that can be used with any instrument, recording, or even a microphone. This input can be sent through the filter, or it can go directly to the output. (With a microphone or instrument you may need to amplify the signal before running it into SID: the maximum input is three volts peak-to-peak.)

SID has a master volume control that ranges from zero to 15. This controls all the voices, the filter, and the external input. You can produce tremolo effects by rapidly raising and lowering the volume.

Voice 3 has a couple of special features that are quite handy. There is a register that you can read to get the instantaneous value of the tone generator's output, and another that lets you read the envelope generator's output.

What are these good for? Well, earlier I mentioned that it would be nice to have another envelope generator to control the filter. You can use voice 3's envelope generator to do this, by putting some statements in your program to read the envelope value and POKE it into the filter cutoff.

You can use the waveform value register in a similar manner. For instance, set up voice 3 to produce a triangle wave at a very low frequency, say 3 or 4 Hz. Then write a program that continuously reads the waveform value, and adds to it the frequency numbers for voice 1 and/or 2. The result is vibrato: continuous up-down variation of the pitch.

Of course, when you're using voice 3 in this manner you probably won't want to listen to it at the same time. Fortunately, there is a control bit that disables voice 3's output so that it won't produce unwanted sounds.

One other use for voice 3: if you set it to the noise waveform at some very high frequency, the waveform value at any instant is essentially random. Thus you have an instant random number generator.

SID contains two A/D converters that are intended for connection to potentiometers for use as game paddles or other control functions. You might buy a used wah-wah pedal, tear out all the electronics, put in a 470K pot, and run it to one of the A/D inputs. Presto, you've got a wah-wah pedal for your computer...or a volume pedal, or a tremolo pedal, etc. Like I said, isn't software wonderful?

The A/D inputs are scanned about once every half a millisecond, so it's possible that they could be used to listen to an external sound and compute its pitch. Then SID could play or sing along with you.

Technical details

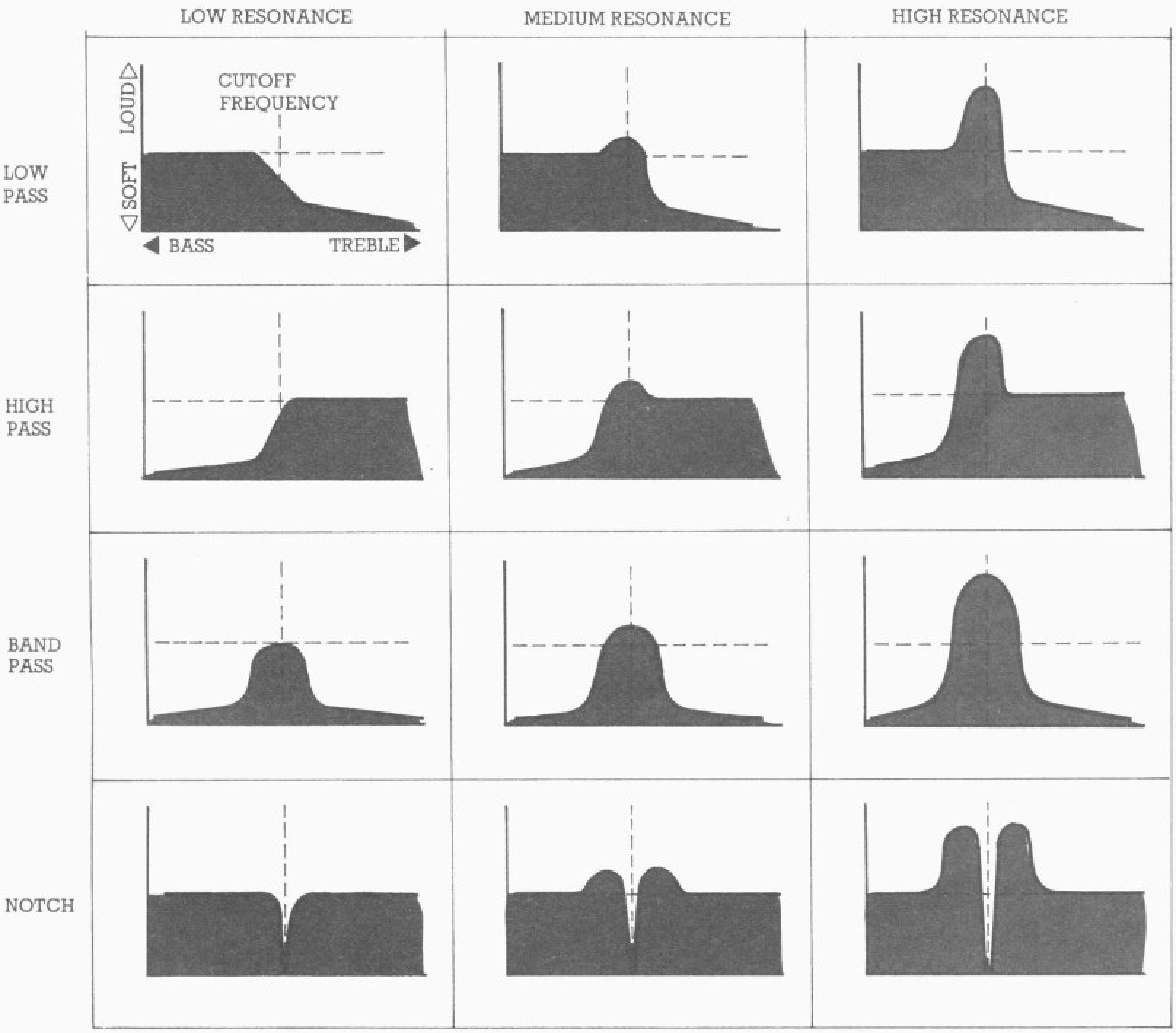
Originally I was going to title this section 'Bugs' or 'Criticisms'; but really this chip is so wonderful that I couldn't bring myself to use such derogatory language. There are one or two things that I just couldn't resist pointing out, though.

Most of the control registers are 'write-only,' meaning that you can POKE things into them but you can't PEEK at them to find out what their current settings are. So you may need to store their values in a table, and have your program update the table whenever it changes one of the registers.

If you've used some other synthesizers, you may notice that SID's filter effects are not quite as intense as you expected. This is because SID's filter has a 12 dB per octave roll-off, whereas most synthesizers have 24dB per octave. You can always set two SIDs, however, and run one into the other through the external input. It'll still cost a heck of a lot less than a new Korg or MiniMoog.

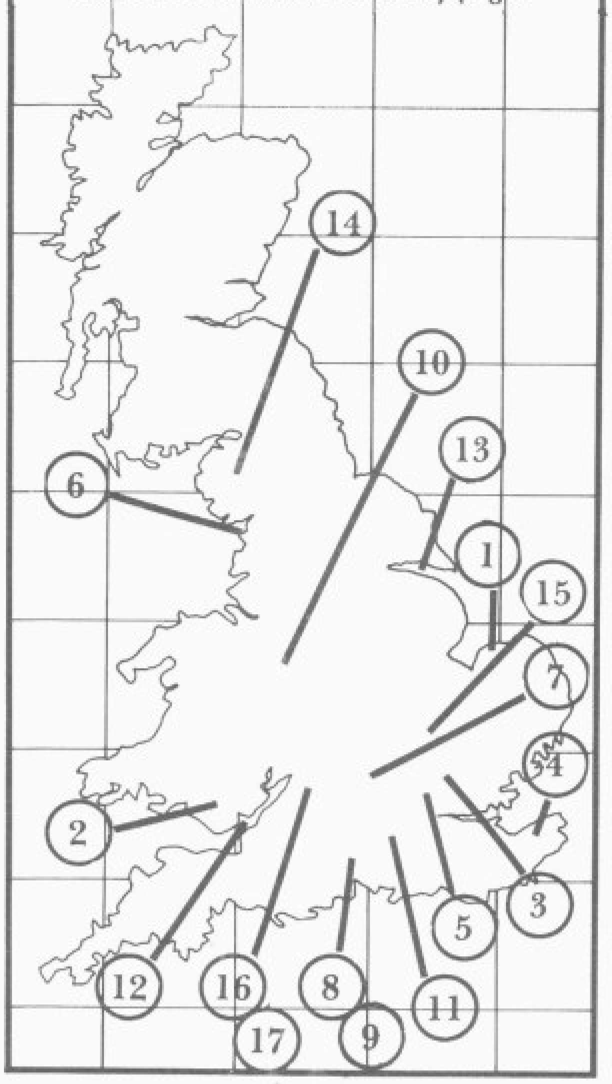
Although SID has a master volume control, it does not have controls that let you set one voice louder or quieter than the others. This could be a problem if you're trying to play a fairly complex piece of music with a lot of variety between the vices. In a pinch, you could write a program to switch a voice's Gate signal rapidly on and off, so that the volume hovered around some intermediate level.

In summary, my hat is off to Commodore for producing a chip that turns a home computer into a real synthesizer. The musical world is bound to be rocked by this exciting development. □



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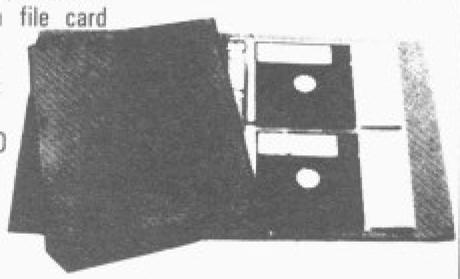
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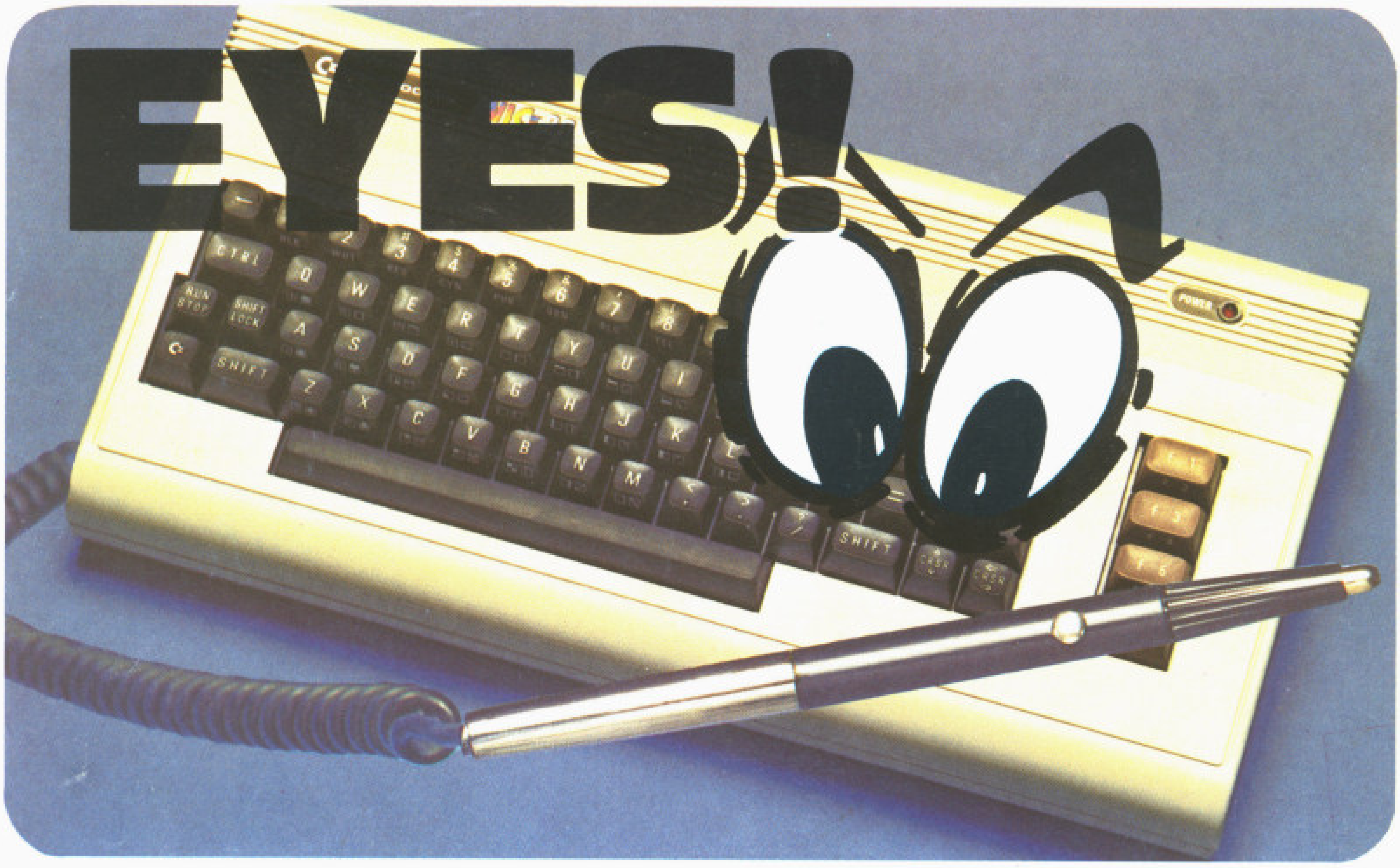
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